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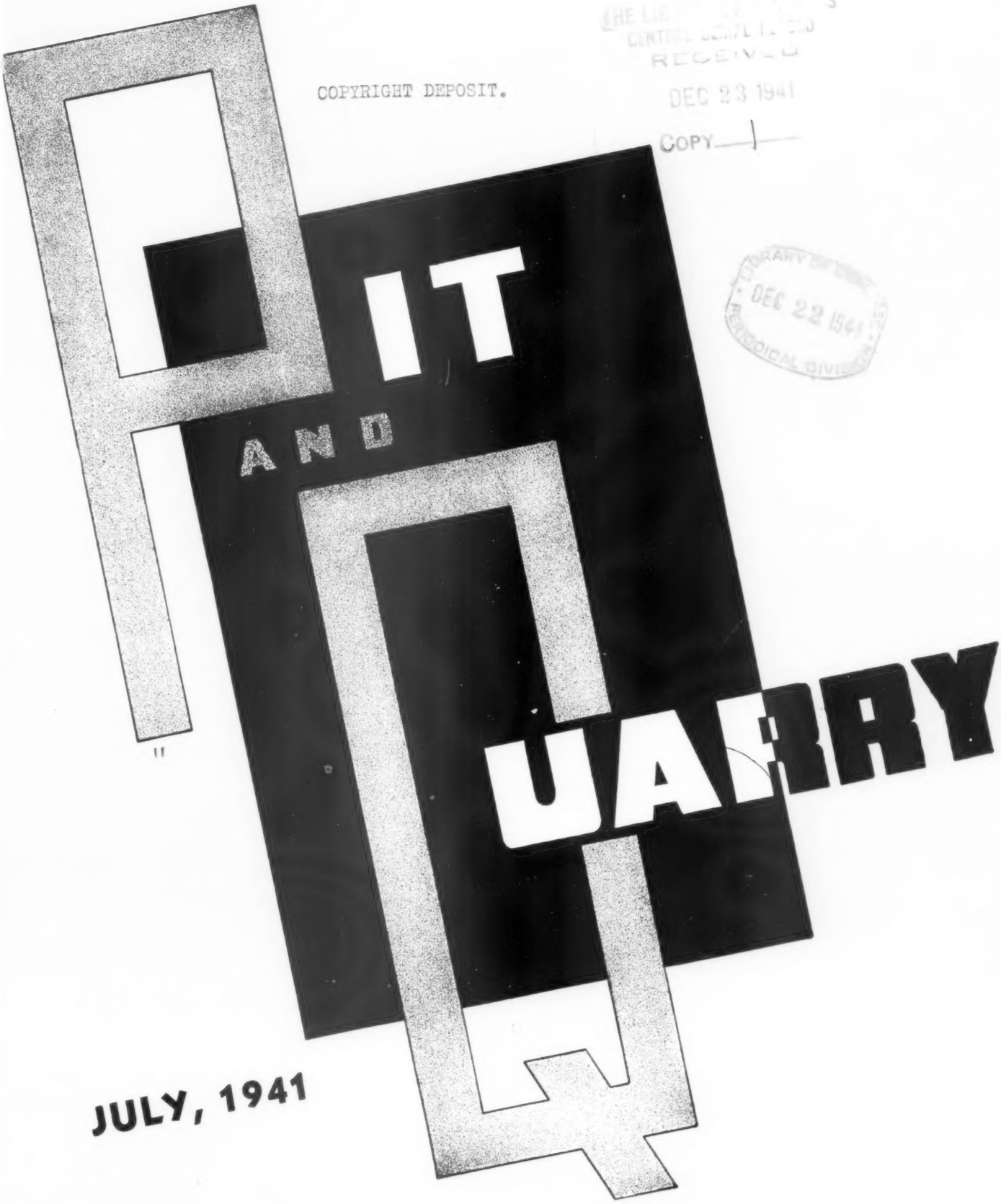

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ANNUAL CEMENT-MILLS NUMBER

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

▼

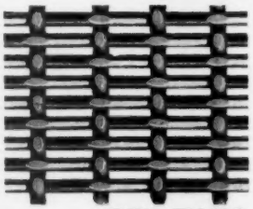
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

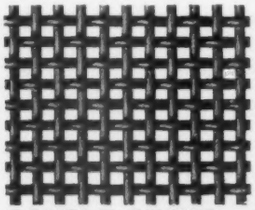
withstand abrasion longer —

endure vibration better —

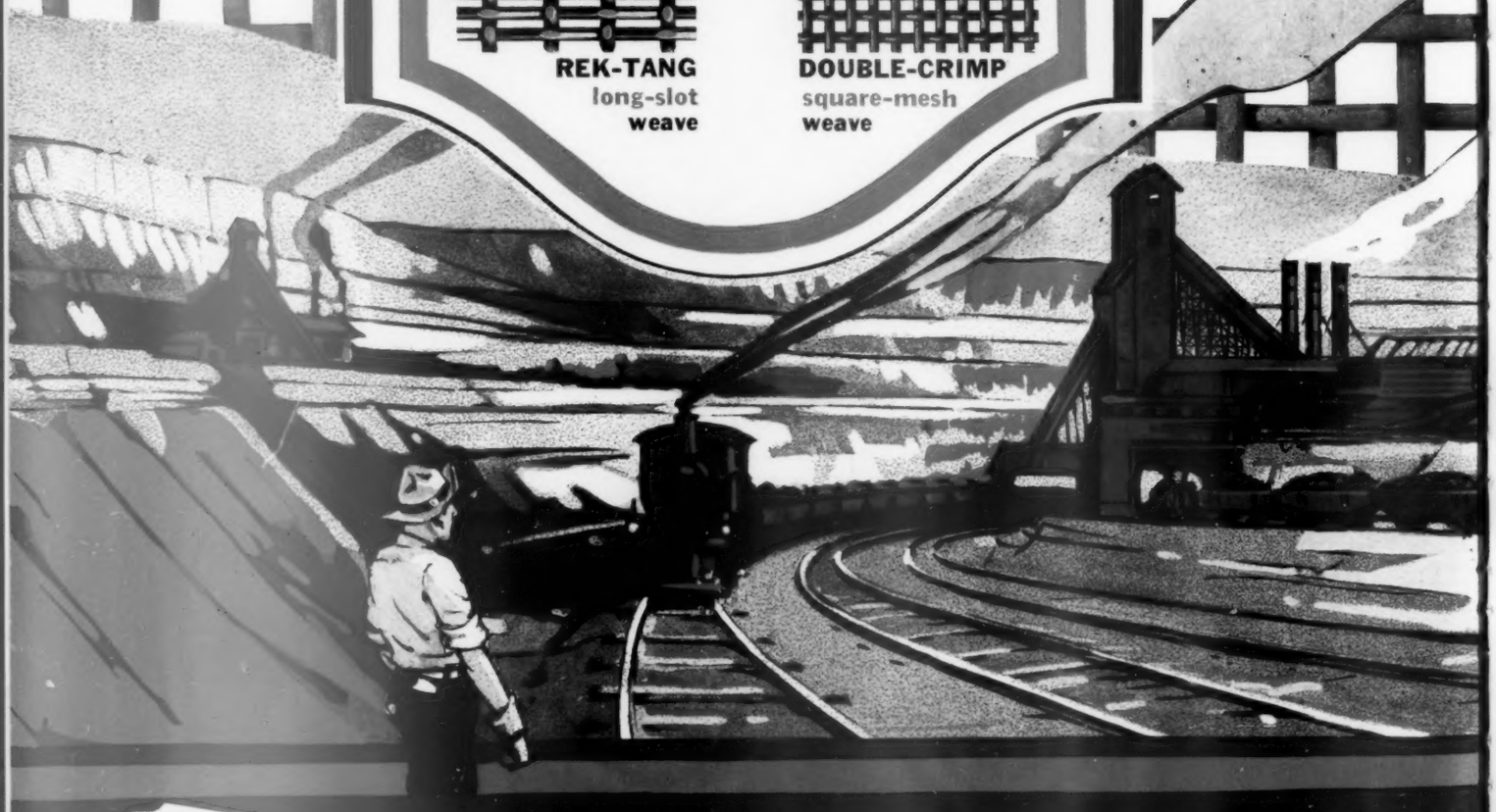
resist fatigue to the utmost



REK-TANG
long-slot
weave



DOUBLE-CRIMP
square-mesh
weave



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare REK-TANG Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR
WIRE COMPANY
SAINT LOUIS

TN1
.P65
20273
6967 D

HERE'S THE REASON

Timber

IS MAKING ENGINEERING HISTORY

TIMBERS joined by TECO Connectors will do more work than timbers joined the old way—with many bolts, plates and angles . . . *Frequently a single 2½" TECO split ring connector will carry more load than six one-half inch bolts.*

Timber construction, fundamentally our lowest cost means of doing heavy work, can now be employed for a wide variety of new applications.

The connector system has revised traditional formulas for designing in timber . . . changed it from a carpentry to an enginering material and stimulated the establishment of widespread new capacity for shop fabrication.

TECO Connectors spread the load on a timber joint over practically the entire cross section of the wood. In bolted joints this stress is localized around the bolt.

WOULD YOU LIKE TO KNOW HOW

nearly 30,000 new structures—hangars, bridges, trestles, dry docks, barracks, trusses, towers and oil derricks—have saved money by employing low-cost TECO-equipped lumber construction?

HAVE YOU FULL, DETAILED INFORMATION ON THE TECO CONNECTOR SYSTEM? WRITE TODAY. USE THE COUPON BELOW.

Timber ENGINEERING COMPANY INC.

Dept. AK-7, 1337 Connecticut Avenue

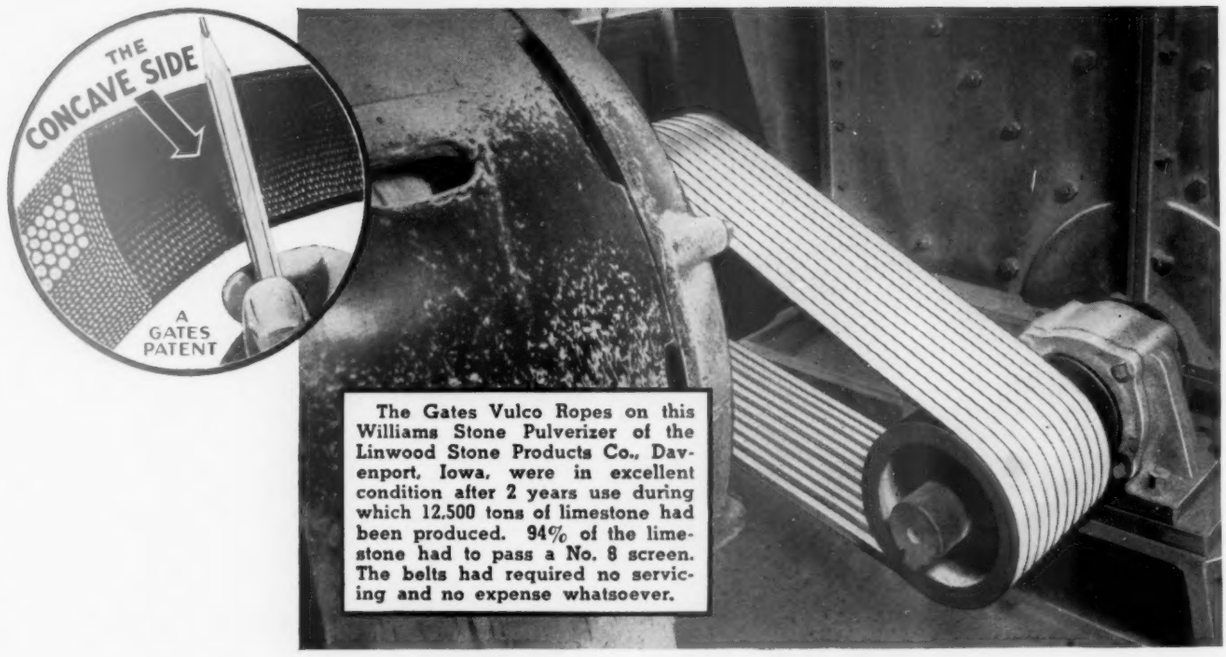
WASHINGTON, D. C.

TIMBER ENGINEERING COMPANY, Inc., Dept AK-7
1337 Connecticut Avenue, Washington, D. C.

Please send us full technical information on the new design opportunities in timber made possible through the development of the Teco Connector system.

Individual .....
Firm .....
Street .....
City ..... State .....

PIT AND QUARRY, July, 1941, Vol. 34, No. 1. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.



The Gates Vulco Ropes on this Williams Stone Pulverizer of the Linwood Stone Products Co., Davenport, Iowa, were in excellent condition after 2 years use during which 12,500 tons of limestone had been produced. 94% of the limestone had to pass a No. 8 screen. The belts had required no servicing and no expense whatsoever.

Grip a Bending V-Belt Like This

and learn of

A BIG SAVING *in Belt Costs and in Power!*

What Happens When a V-Belt Bends

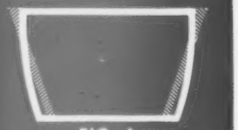
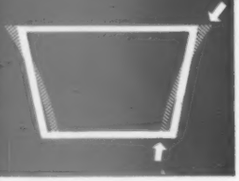


FIG. 1



Here is a simple fact about V-belt wear that you can prove in two minutes —and it will save you real money.

Pick up any V-belt you have handy. Grip its sides with your fingers—then bend the belt as it would bend in going around a pulley. You will feel the sides of the belt *change* shape! If the sides were *straight* before bending, they become *convex* as the belt bends. (See Figure 1 on the left). Note the out-bulge of the sides.

Now look at Figure 2. This shows the *same* shape-change in a belt with the patented concave side. But what a different result! This belt, when bent, precisely fits the sheave groove. Two big savings result—(1) There is no side-bulge and this means uniform side-wall wear—*longer life!* (2) There is a full side-width grip on the pulley and this carries heavier loads without slippage—saving the belts and also saving your *power!*

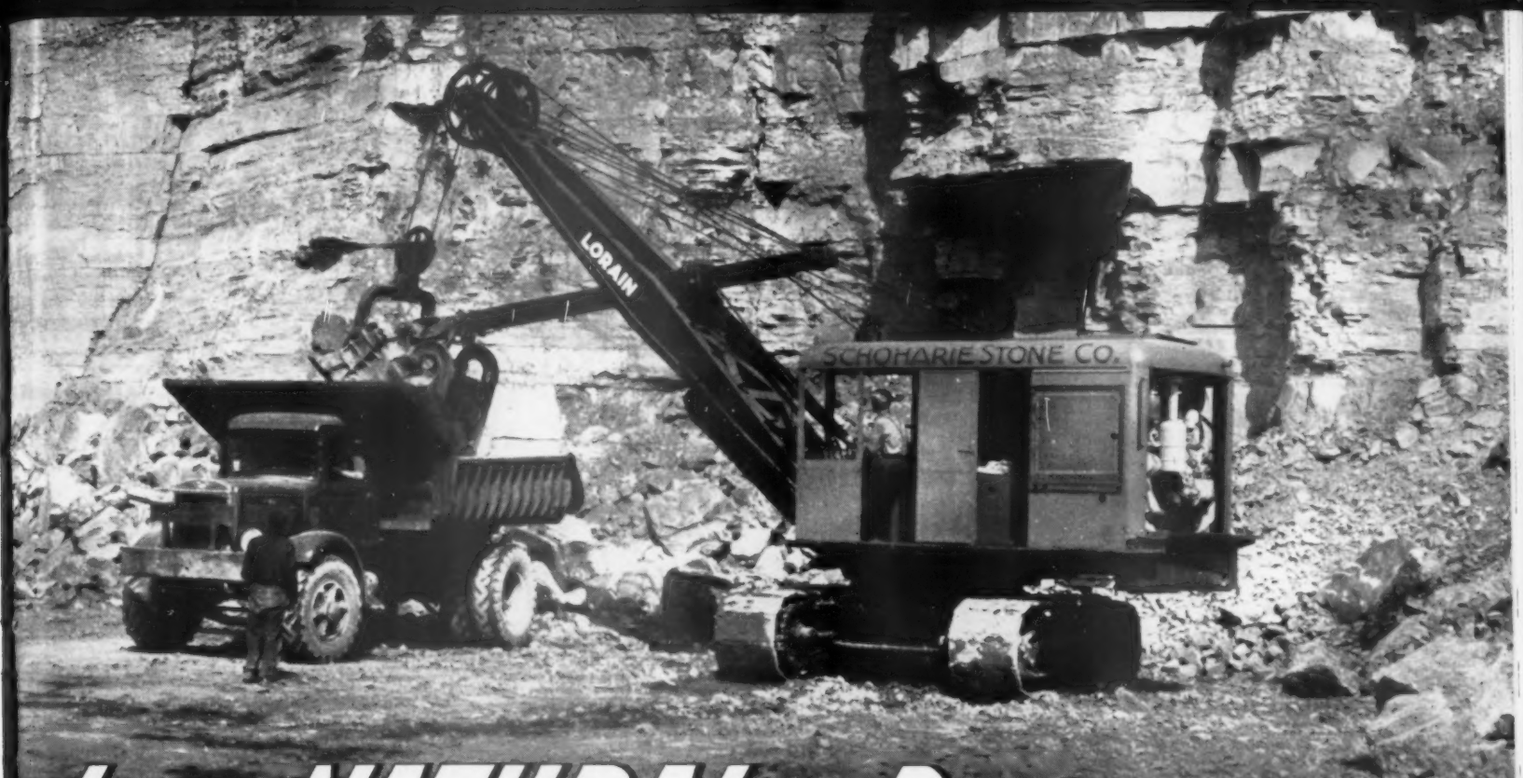
The concave side is a Gates patent. Only belts built by Gates are built with the concave side.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 1524 South Western Ave.
HOBOKEN, N. J. Terminal Building
BIRMINGHAM, ALA. 1631 1st Ave., South
LOS ANGELES, CAL. 2240 E. Washington Blvd.
DENVER, COLO. 999 South Broadway
DALLAS, TEX. 2213 Griffin Street
PORTLAND, ORE. 333 N. W. 5th Avenue
SAN FRANCISCO, CAL. 2700 16th Street



It's a NATURAL in Rock

or

SCHOHARIE STONE CO.
wouldn't have
LORAIN No. 7

21 POINTS OF PROFIT
IN LORAIN-80 DESIGN AND CONSTRUCTION

TURNTABLE

1. Double Center Drive pinion which —2. Applies power directly—fully concentrated on any one operation— 3. Or spreads power for high-speed simultaneous operations.
4. Two-piece swing drums designed to take the punishment of the hardest worked part of the shovel.
5. Crowd clutch, extra wide to deliver full digging power, mounted on roller bearings; two-piece, easily reversed bands.

CRAWLER

1. Center "Chain" Drive.
2. Two speeds either direction.
3. Steers either direction.
4. Safety travel and tread lock.
5. Mechanism runs in oil bath.
6. Generous underneath clearances.
7. Centralized lubrication.
8. Wider treads.

SHOVEL BOOM

1. All-welded (strength: all-steel: torsion-resisting).
2. All-steel dipper stick.
3. Door stops to protect stick.
4. Automatic power dipper trip.
5. Automatic crowd brake to hold stick extended.

CRANES, CLAMS, DRAGS

1. Simultaneous hoist, swing and travel (or boom derricking).
2. High-speed boom hoist—power and precision control of boom derricking and lowering.
3. "Cable-Miser" fairlead with interlocking, geared sheaves.

THEW CENTER DRIVE

This new 1¾-yd. Lorain-80, which is operated by the Schoharie Stone Co., Schoharie, N. Y., is the seventh Lorain purchased for quarry service by its parent organization, the Cushing Stone Co. That's one successful company's answer to the question, "Are Lorains real rock shovels?" And there are plenty more owners who say "Yes" convincingly, with similar records for repeat orders on Lorains.

The 1¾-yd. Lorain-80 is but one in the complete line of ⅜ to 2½-yd. Lorains—and you can take your pick knowing that each and every one is a seasoned rock shovel. Write today for complete catalog information.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

1¾ YD. LORAIN-80

Amsco Pumps Give Longer Wear

They Can "Take It" Because the "COUNTERFLOW" Design and Amsco Manganese Steel are Unbeatable

THE "COUNTERFLOW" design of Amsco Dredge Pumps forces circulation of clear water between the impeller shrouds and the side plate liners, reducing abrasive wear. The wide funnel-mouthed impeller minimizes end thrust and internal leakage. Another important feature of Amsco design is the method of securely attaching the impeller to the shaft either with threads or tapered bore and lock nut.

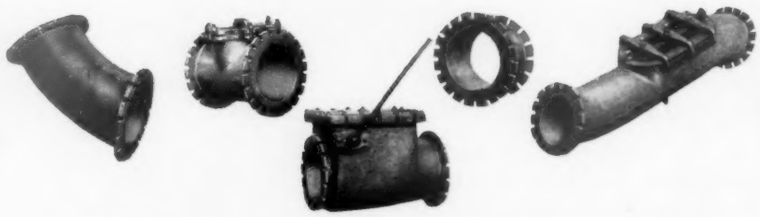
All Amsco Dredge Pump "water-ends" are made of genuine 13% Manganese Steel, which, beyond comparison, resists abrasion associated with severe repeated impacts.

Wherever sand and gravel are being dredged at the lowest cost and with minimum maintenance and shut-down time, you are likely to find Amsco on the job. More Amsco Dredge Pumps are used for commercial sand and gravel production than any other make; and many are also employed in river and harbor dredging.

For steady, economical, trouble-free production of aggregates, the sand and gravel industry has voted overwhelmingly with its equipment dollars for the Amsco line of manganese steel dredge pumps.

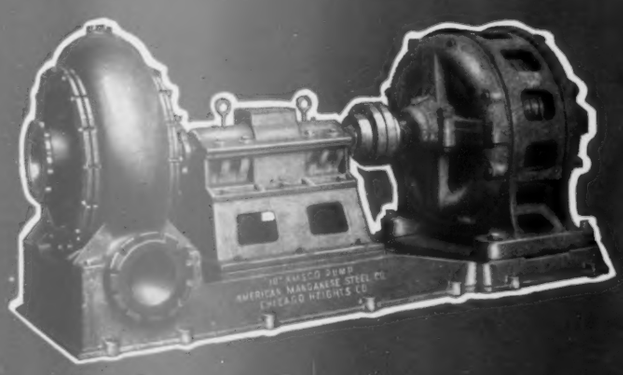
If you haven't already seen them, send for our latest Bulletins on dredging and material handling pumps, screening ladder chain, cutter heads, and pipe fittings.

Amsco Basket Type Cutter Head for clay, sand, silt and softer materials.

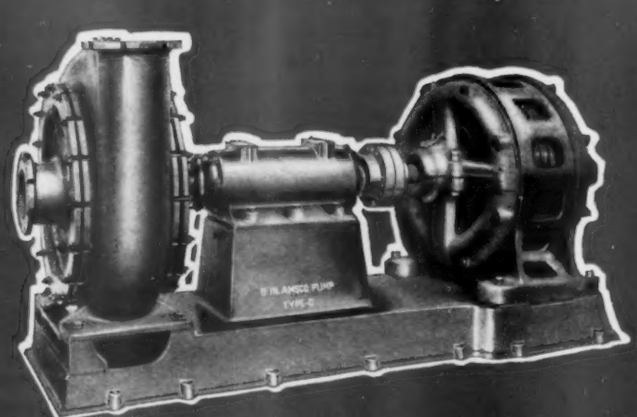


Sound wear resistant fittings are a necessary complement to a good pump. These elbows, nipples and flap valve are also made of tough Amsco Manganese Steel.

Amsco Combination Type Cutter Head for cemented gravel and impacted materials.



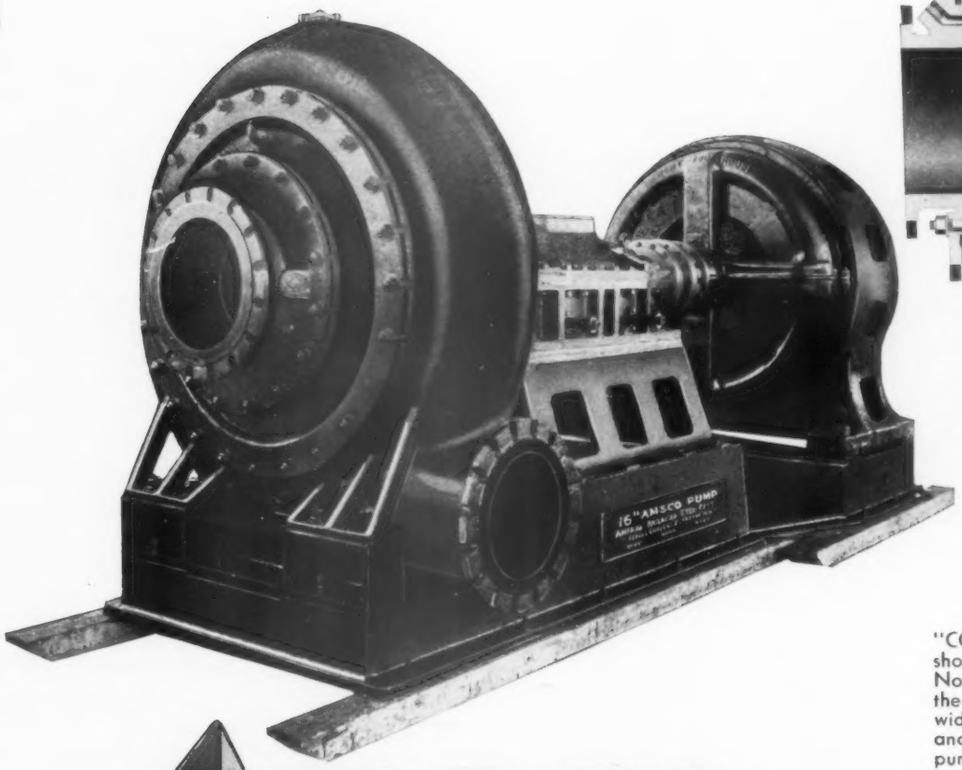
Amsco 10" Type "M" Form 31, directly connected pump with right-hand bottom discharge.

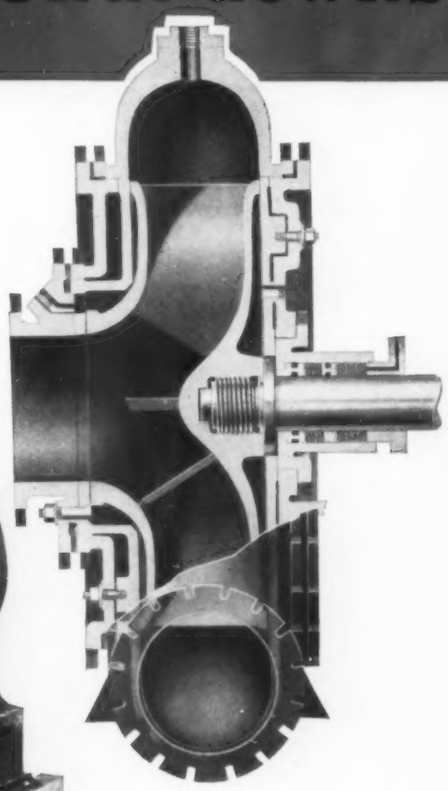


Amsco 8" Type "C" directly connected top discharge pump with combination ball thrust and ring oiling sleeve bearings.

. . . . Result in Fewer Shut-downs

16" Amsco Type "XHCF" Form 44, Heavy Duty "COUNTERFLOW" DredgePump, Right Hand, Bottom Discharge, directly connected to a 600 H.P. Westinghouse slip ring Motor, 505 R.P.M.





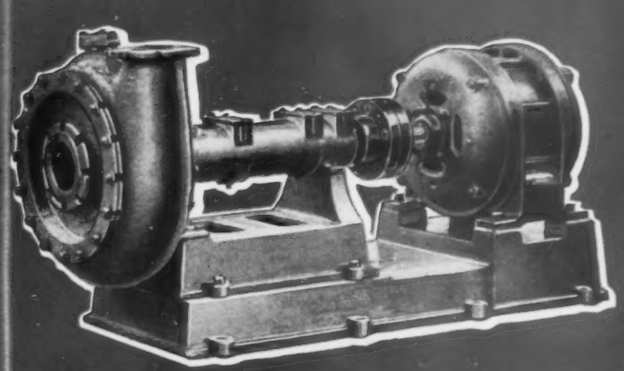
"COUNTERFLOW" design details are shown on the section drawing above. Note clear water is circulated between the impeller shrouds and side plate liners, wide funnel-mouth impellers are used and impellers are screwed onto the pump shafts.

Amsco

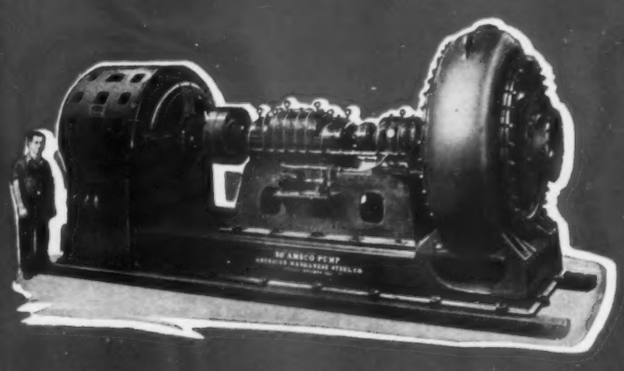
GENUINE MANGANESE STEEL, *"THE TOUGHEST STEEL KNOWN"*

AMERICAN MANGANESE STEEL DIVISION, Chicago Heights, Ill.
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO. OFFICES IN PRINCIPAL CITIES.



Amsco 6" Type "I," Form 20, Pump with right-hand vertical discharge, direct motor drive and combination ball thrust and ring oiling sleeve main bearings.



Amsco 20" Type "XHCF", Form 57, directly connected "COUNTERFLOW" Pump with right hand bottom discharge, water-cooled marine type thrust bearings and force-feed lubrication.

"It's a Lot of Shovels All in One"!

Check over the things you like about any power shovel—the reasons why you'd buy it—you'll find the things you like about each one brought together in one shovel—the Buckeye Clipper, with the plus value of Vacuum Control.

No shovel in its range today offers as much as Buckeye's preference points—you'd have to own a dozen other shovels to get them all, but they're all in the Clipper and all the accepted practices of shovel construction besides: alloy steel stress parts, safety glass in cab, complete metallurgical laboratory control of molded, forged and pressed parts.

Some shovels give you one or a couple of these design and operating advantages —Clipper gives you all and 16 others besides—no wonder the swing is to Clippers, the original vacuum power control shovel!

Pick Your Preference Points on other makes of shovels—you find them all in the BUCKEYE CLIPPER

(1) Vacuum Control
(2) Safety Power Drum Brakes
(3) Simultaneous Hoist, Swing and Travel
(4) 4 Anti-Friction Bearinged Hook Rollers
(5) Anti-Friction Bearings on Main Machinery Shafts
(6) Flame Hardened Gears
(7) Gear-Universal Power Hook-Up
(8) Vacuum Power Trip

Quickly convertible to crane, dragline, trench hoe, pile driver, etc.

Model 50, ½ yd. ✓ Model 60, ⅝ yd. ✓ Model 70, ¾ yd. ✓

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Built by Buckeye ✓

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

identifies your rope by NAME and COLOR

A colored tape, known as Telfax, is woven throughout the length of all Bethlehem wire ropes. The grade of steel is printed continuously along this tape, and as a double check, each grade has its own special color:

Purple	Improved Plow Steel
Green	Plow Steel
Yellow	Mild Plow Steel
Red	Cast Steel
Brown	Traction Steel
Black	Iron

These six grades of steel vary greatly in strength. It is important to use the correct grade on any given job. With the Telfax tape you can check grade quickly and easily, even if identifying labels or tags have been lost or the rope respooled.

Play safe. Protect the lives of your workmen and the investment in your equipment by using Bethlehem wire rope, with the Telfax marker.

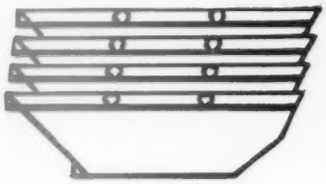
BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

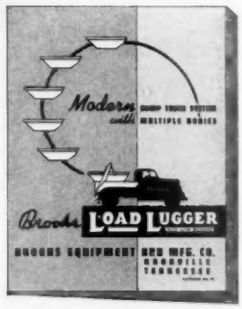
At the Heart of the Job

Brooks
LOAD LUGGER

The Ace
of Multiple Body Type
DUMP
TRUCKS



Buckets can be nested. Saves time in carrying empties. Capacities 1½ to 4 cu. yds.



Get the facts about this safe, modern system of handling materials. Write for Catalog No. 44.

Always in the midst of the busiest jobs, the LOAD LUGGER keeps up a steady circulation of material . . . from quarry to crusher . . . from pit to road . . . from supply yard to stock pile.

Quarry operators, lime and cement producers, road builders and contractors, all are using this safe, modern system of handling materials. It speeds up the work and cuts costs 25% to 50% or more.

The demand for LOAD LUGGERS has doubled and redoubled to meet the requirements of defense and industry. Order yours now, and let it earn extra profits for you.

Brooks Buckets are one-piece all-welded construction and reinforced.

For best results use 5 to 10 buckets with each Load Lugger.

Ask about our Special Introductory Offer of a Two Weeks' Trial of the Brooks LOAD LUGGER

Brooks EQUIPMENT AND MFG. CO.

Distributors in all Principal Cities

107 Davenport Road, Knoxville, Tennessee

NEW NAVAL AIR BASE

Needs 370,000 yards sand and gravel

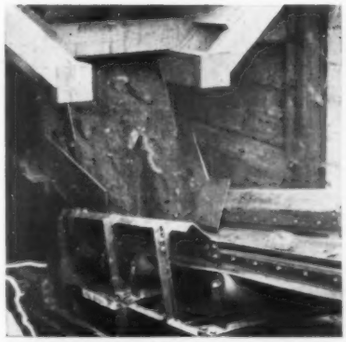
The 18″ x 30″ *Telsmith Roller Bearing Jaw Crusher* (center background) crushes the plus 4″ material rejected by the *Telsmith Rotary Grizzly*; and a No. 36 *Telsmith Gyrasphere Crusher* (left foreground) crushes 2½″ to 4″ rejected by *Single Deck Telsmith Pulsator* vibrating screen.

THIS TELSMITH PLANT RUNS 20 HOURS A DAY TO SUPPLY IT

The Navy's new 25 million dollar air base at Quonset Point, R. I., will require about 370,000 yards of washed sand and gravel. This aggregate is being furnished by the Boston Sand & Gravel Co. of Cambridge, Mass., with a brand new and completely modern Telsmith Plant located near East Greenwich, R. I.

Telsmith engineers, in co-operation with the Boston Company officials, designed the plant especially for this job, and all major equipment was furnished by Telsmith. A capacity of 150 T.P.H. was figured, but the plant produces as high as 250 T.P.H. Average production is 200 T.P.H. of Navy 1″ and 2″ aggregate and concrete sand—4000 tons per 20-hour day, with plant operating at times at temperature as low as 16° F.

For dependable advice and quick service coupled with the best in equipment, bring your problem to Telsmith. *Write for descriptive Bulletin G-15.*



Under hopper with rail-bar grizzly, 30″ x 5′6″ *Telsmith Plate Feeder* regulates flow of material onto belt conveyor feeding scalping and crushing plant.

Throughs from a No. 450 *Telsmith Rotary Grizzly* flow over a 5′ x 10′ *Telsmith Single Deck Pulsator* and minus 2½″ goes to washing and screening plant.

Both crushers discharge onto a return conveyor and, at point of transfer to main conveyor, a 3′ x 8′ *Telsmith Double Deck Pulsator* removes fines.

60″ x 18′ *Telsmith Standard Washing Screen* scrubs and sizes gravel. 48″ x 24′ and 36″ x 20′ *Telsmith Sand Drags* wash and dewater sand.

SMITH ENGINEERING WORKS
624 E. CAPITOL DRIVE, MILWAUKEE, WIS.

Cable Addresses: Sengworks, Milwaukee—Conerete, London

Room 1804—50 East 42nd St. New York City

211 W. Wacker Drive Chicago, Ill.

713 Commercial Trust Bldg. Philadelphia, Pa.

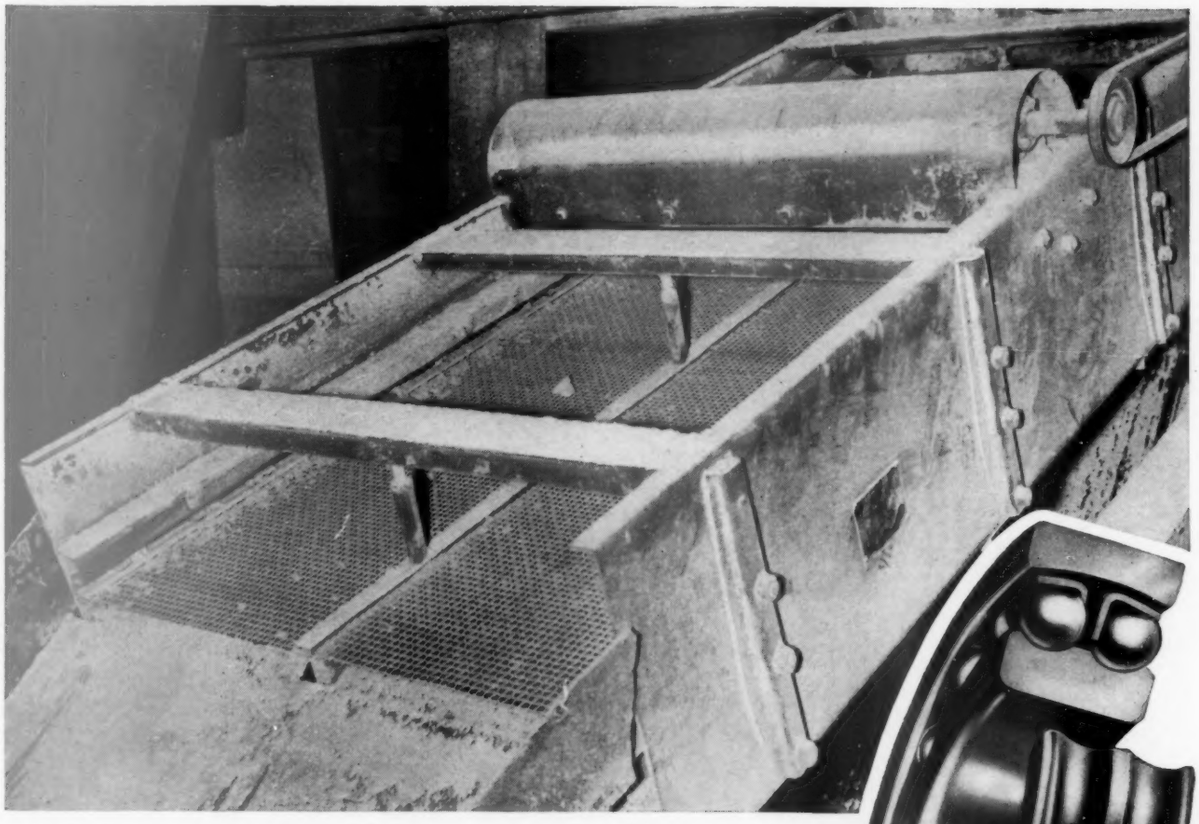
81 Binney St. Cambridge, Mass.

Brandeis M. & S. Co. Louisville, Ky.

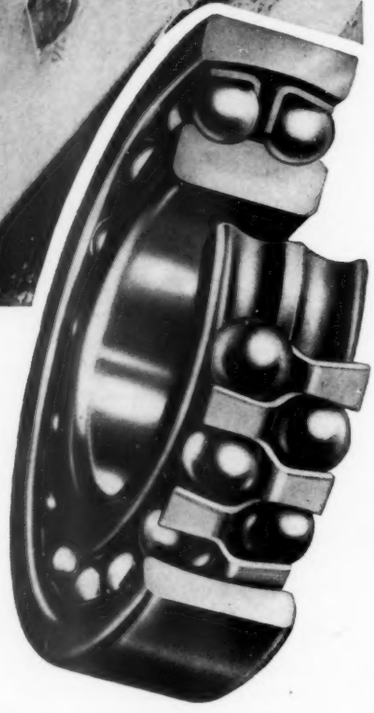
Charleston Trac. & Eqpt. Corp. Charleston, W. Va.

Roanoke Trac. & Eqpt. Co. Roanoke, Va.

G. F. Sawley & Co. Toronto, Ont.



BUILT BY UNIVERSAL VIBRATING SCREEN CO., *this Type "MR" 42" x 96" Screen has SKF Bearings on the vibrating mechanism.*



Vibrating Screens

STAND UP WITH SKF

Intensive vibration can shake this "MR" 42" x 96" Double Deck Universal Screen from end to end. But it makes no difference to its SKF Bearings that are properly sealed against dirt, have close-fitting parts, self-aligning characteristics, and need no correction for wear. Properly lubricated, SKF Bearings on Universal Screens often stand up under these conditions for more than eight years. Can the bearings on your screens do THAT?

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

4837

SKF

BALL AND ROLLER BEARINGS

TO CUT ROPE COST...

KEEP YOUR EYE ON THE ROEBLING "4"

The Roebling "4" combine to give you the one thing above all that counts in wire rope service. And that is — utmost *overall* rope safety and minimum *general average* rope operating cost — economy based on your ropes *as a whole.*

ROEBLING
"Blue Center"
STEEL
WIRE ROPE

WIRE ROPE HIDES NO SECRETS HERE!

This wire rope fatigue machine is an outstanding example of Roebling's aggressive research and exceptional facilities.

It is the largest and most highly developed wire rope fatigue machine in existence, designed by Roebling for use in studying rope characteristics. With this machine is carried on a never-ending search into the wearing and fatigue qualities of wire rope under various bending and tension conditions.

ROEBLING 1841 1941 100TH ANNIVERSARY

JOHN A. ROEBLING'S SONS COMPANY TRENTON NEW JERSEY

Branches in Principal Cities Export Division: 19 Rector St., New York, N.Y., U.S.A. Cable Address: "Roebling's", New York

THE FASTEST BUCKET OF ITS TYPE FOR HEAVY MATERIAL and HARD DIGGING

● When the digging is tough—
that's when a Williams proves the extraordinary power and ruggedness built into it. Watch it bite into "hard stuff" and come up with full capacity loads that spell time saving and profitable yardage. Williams Buckets embody many exclusive features that give them unusual power and longer life.

Williams Buckets and Parts are carried by distributors in all parts of the country. Bulletins covering Williams Power Arm, Multiple Rope, and Dragline Buckets sent on request.

THE WELLMAN ENGINEERING CO.
7014 Central Avenue · Cleveland, Ohio

WILLIAMS *Buckets*
***built by* WELLMAN**

DEMPSTER DUMPSTER

THE ORIGINAL BUCKETRUX

The New Model AP (Automatic Pickup) DEMPSTER-DUMPSTER leads again in the latest development in the detachable bucketrux field. A forked lift eliminates the lifting chains on the buckets. Pickup, carrying, dumping and return are speeded up, bringing even greater efficiency and lower cost to this modern hauling method. DEMPSTER-DUMPSTERS are supplied in sizes ranging from 1½ to 6 cubic yards . . . capacities 4,500 to 12,000 lbs. pay-load . . . in Drop-Bottom, Skip Type, Tilt Type and enclosed Buckets.

Skip Type Container in carrying position.

Drop-Bottom Bucket in dumping position.

Investigate . . . Check with the Operators Who Use Them . . . Write for Details of Our Trial Offer

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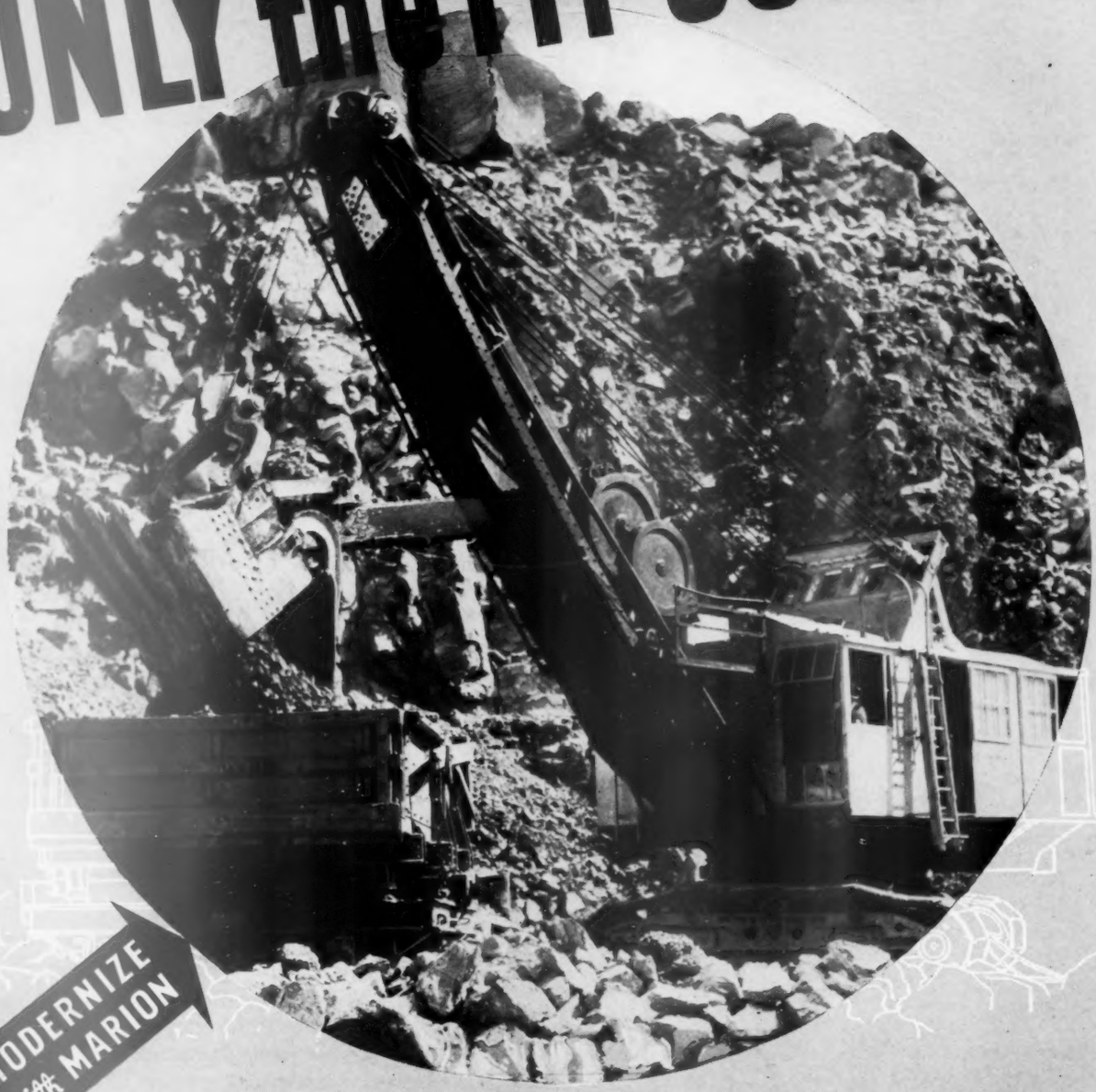

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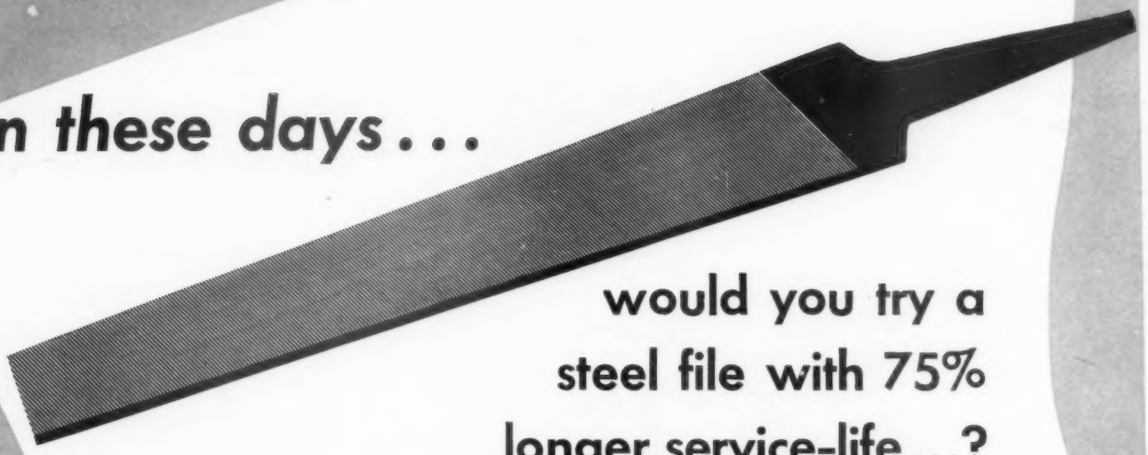

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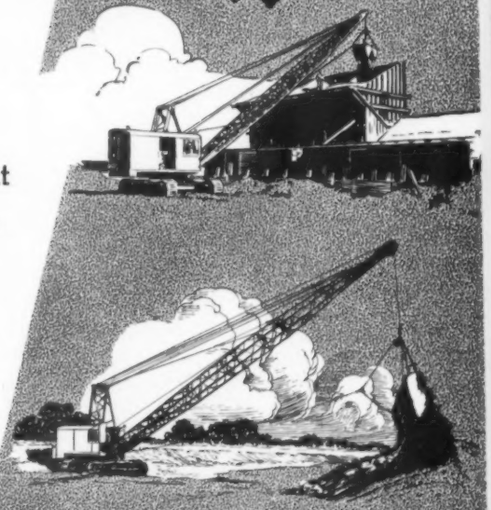

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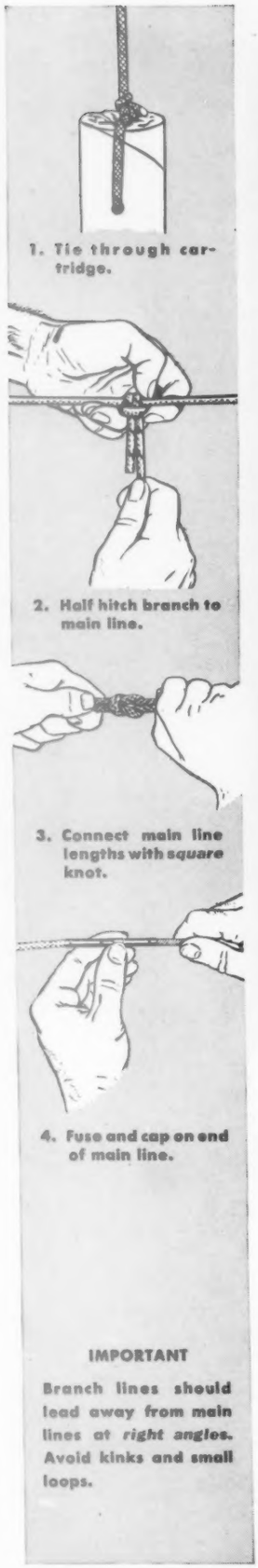
1. Tie through cartridge.
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3. Connect main line lengths with square knot.
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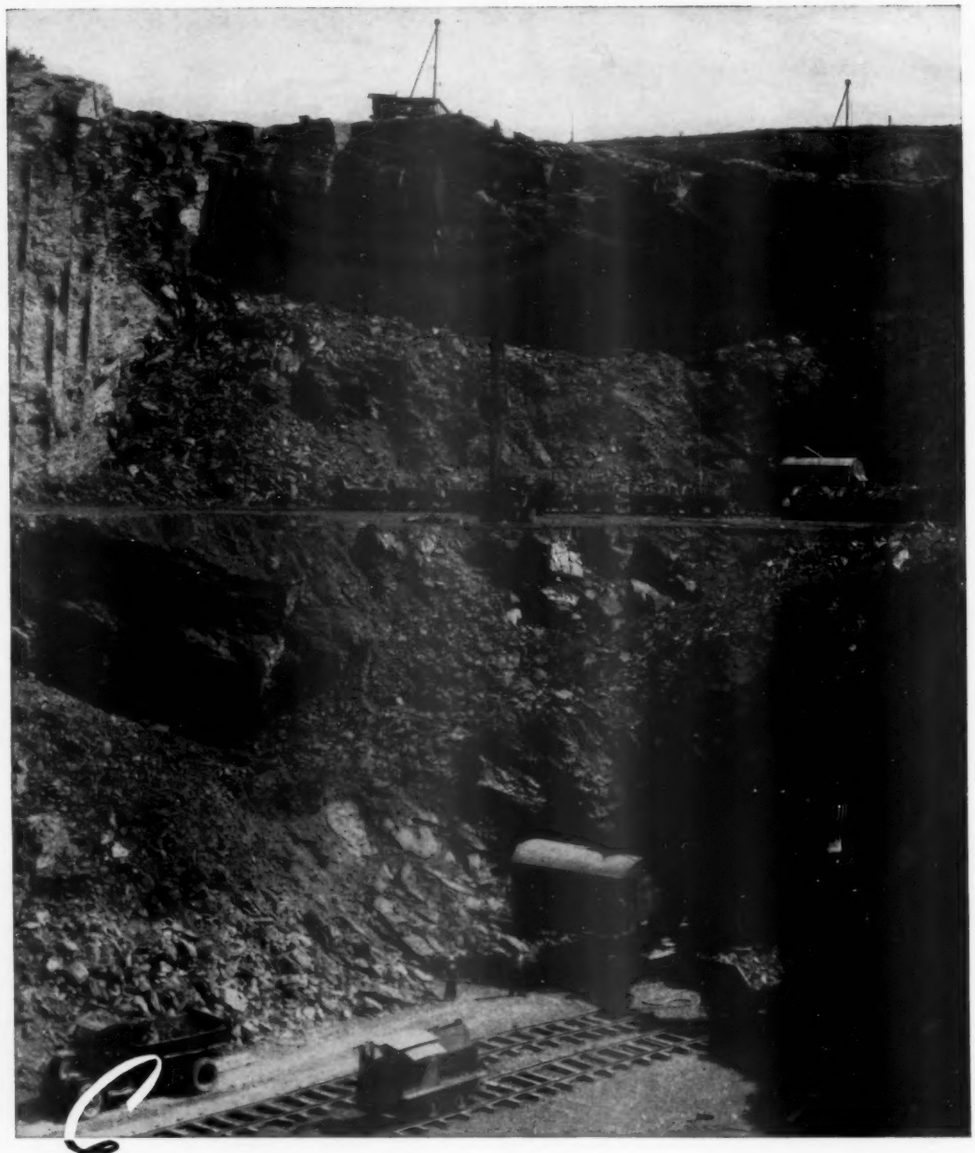
IMPORTANT
Branch lines should lead away from main lines at right angles. Avoid kinks and small loops.



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IN LABOR

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Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

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PIT AND QUARRY

Vol. 34 JULY, 1941 No. 1

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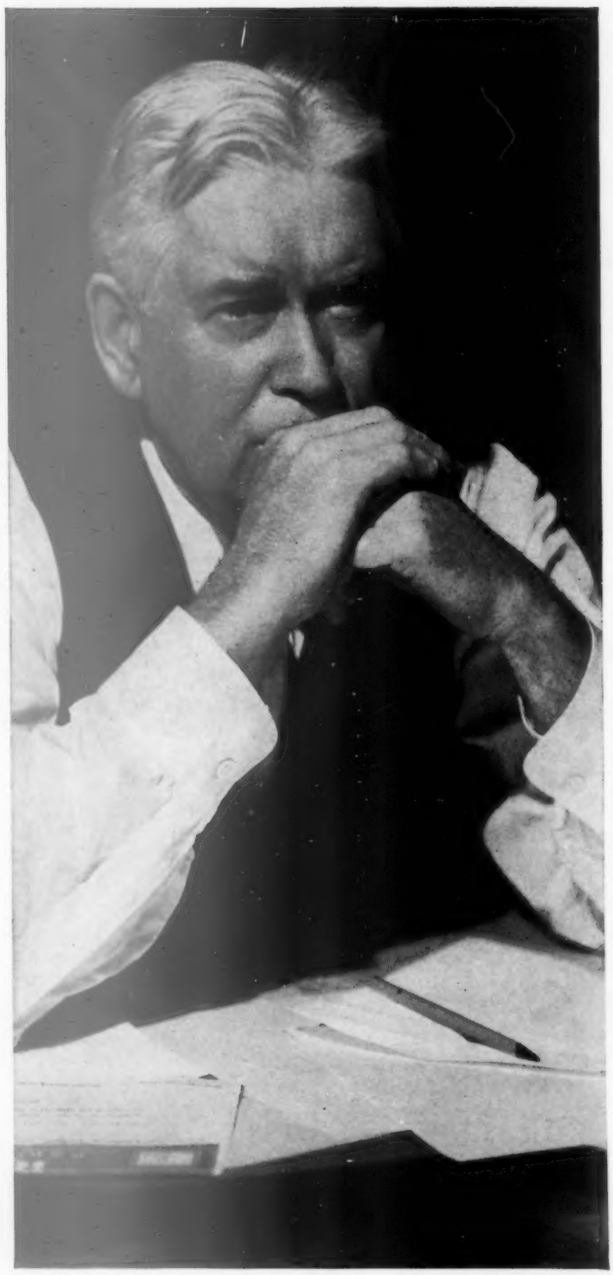

Mr. Operator,

WHAT WILL BREAK DOWN NEXT?

☆ Now that you have taken on all that extra defense work, Mr. Operator, how about the greatly increased burden on your machinery? Interrupted production—breakdowns—can beat you and your whole defense effort.

Look at that equipment of yours! Last week the plant was down twelve hours for repairs. (Fortunately, the factory was nearby and happened to have the necessary parts!) The other day we pointed out at least a dozen vital points in your plant where badly worn or obsolete machinery was carrying the entire production load. No spares in sight for any of it, either. What'll break down next, Mr. Operator?

Order a thorough check-up today on all possible "trouble points" to get rid of your operating headaches. Then get spare parts or new equipment to bolster the weak spots and step up production.

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★ Robins offers a complete service in designing, redesigning or enlarging handling facilities for coal, coke, ore, stone, sand and gravel, and other bulk materials. *Conveyors*, *Idlers*, *Pulleys*, *Vibrating Screens* and *Screen Cloth*, *Feeders* and *Gates*, are a few of the many ROBINS products available for reasonably prompt shipment. Address inquiries to Robins Conveying Belt Company, Passaic, N. J.

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Rademaker Chemical Co. Plans Magnesite Plant in Michigan

The Reconstruction Finance Corporation has authorized a loan of $300,000 to the Rademaker Chemical Corporation, Eastlake, Michigan, to build and equip a plant for the manufacture of dead-burned magnesite, a material essential to the national defense program, since it is used in the construction and maintenance of open-hearth steel furnaces.

In the past this company has been a large producer of bromine and other constituents were largely wasted. In addition to the recovery of magnesia from the brine the magnesite content of dolomite, used for precipitating magnesia, will be utilized. This dolomite probably will be shipped raw from Sturgeon Bay, Wisconsin, and calcined at Eastlake. A process for recovering magnesia from brine has been operated successfully at Newark, California, for several years.

Cement Company Acquires Block-Machine Rights

The Carrara Portland Cement Company is completing the construction of about 20 mortarless-masonry buildings at its new cement plant at Carrara, Nevada. The company has acquired the Nevada rights for this system of reinforced-concrete construction and equipment for making it from the Mortarless Tile Machine Company of Los Angeles.

Another plant for the manufacture of the units is being established at Las Vegas, Nevada. The Carrara Company now operates four Mortarless machines.

Fire Damages National Gypsum's Wool Plant

Fire, believed to have started in a cupola room, razed the central portion of the National Gypsum Company's mineral-wool plant near Alexandria, Indiana on the afternoon of May 24 causing loss estimated by officials of the company at more than $100,000.

The plant was purchased only recently from the General Insulating & Manufacturing Company.

Huge Blast Detonated at Calaveras Quarry

About 325,000 tons of rock were loosened in a blast at the San Andreas Quarry of the Calaveras Cement Company recently.

Thirty-nine 7½-inch holes were loaded to a depth of about 125 feet, 45 feet from the working face.

Among those present as guests of the company to witness the blast were Walter W. Bradley, state mineralogist; General J. O. Donovan, in charge of selective draft in California; Clyde Laizure, state division of mines engineer, and newsreel camera men.

The blasting operations were in charge of George Wheaton and George Trescher.

Awards Contracts for New Insulation Plant

The American Rock Wool Corporation of Wabash, Indiana, has awarded the contract for the construction of its new mineral-wool plant at Red Wing, Minnesota to the August Cederstrand Company of Minneapolis.

The new plant will be ready to operate by October, it is reported, and will involve the expenditure of about $250,000.

Plant Idle Since 1930 to Resume Production

Idle since 1930, workmen are rehabilitating the San Juan Bautista, California plant of the Pacific Portland Cement Company and the plant is expected to go into production again before the end of the summer.

Much new machinery is being installed.

Alabama Quarry and Mine Honored for Fine Safety Records

Outstanding safety records achieved by mines and quarries were recognized through the announcement of winners in the National Safety Competition of 1940, made by Dr. R. R. Sayers, Director of the Bureau of Mines.

Three hundred and sixty-two mines and quarries operating in 38 states took part in this competition, the 16th annual contest conducted by the Bureau of Mines.

Contestants were entered in each of the following six groups: anthracite mines, bituminous-coal mines, metal mines, nonmetallic-mineral mines, open-cut mines, and quarries.

The "Sentinels of Safety" trophies, donated by *Explosives Engineer,* were awarded to the winner in each of the six groups, and certificates of honor were given to those ranking second, third, fourth and fifth in each group.

Four bituminous-coal mines, four metal mines, six nonmetallic-mineral mines, 12 open-cut mines, and 73 quarries operated during the contest year without an injury that caused any employee to lose time from work.

The No. 5 limestone mine, Bessemer, Alabama, was awarded the trophy in the nonmetallic-mineral-mine group. This mine was operated by the Tennessee Coal, Iron, & Railroad Company for 248,412 man-hours during 1940 without a lost-time accident.

The Dolonah limestone quarry, also operated by the Tennessee Coal, Iron, & Railroad Company, was the trophy winner in the quarry group. This quarry, located near Bessemer, operated 264,720 man-hours without a lost-time accident.

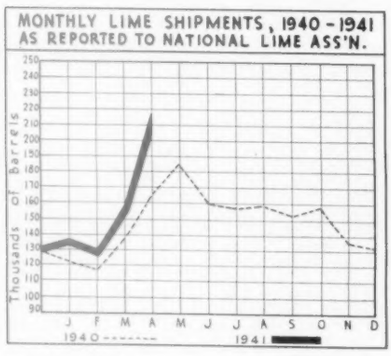
A sand-and-gravel dredge and loaded barge, owned by the New Harmony Sand & Gravel Company, New Harmony, Indiana, overturned and sank in the Wabash River recently.

Gypsum Sales Rise Sharply; Demand for Board Highest

Consumption of gypsum products in the January-March period of 1941, as indicated by sales volumes reported to the Bureau of Mines by producers, increased considerably over that during the like period of 1940 and, after allowing for seasonal influences, was above the high rate of consumption attained in the final quarter of last year. Domestic crude production increased markedly in the first quarter of 1941 and, together with the large volume of crude imports, comprised an apparent supply 30 per cent. greater than in the like period of 1940. Kettle and kiln output of calcined gypsum, likewise, increased nearly one-third.

Sales of Portland-cement retarder in the January-March period reflected closely the increased activity shown in the cement industry and advanced to a volume nearly half again as large as that of the similar quarter of 1940. Sales of agricultural gypsum were slightly above the relatively high volume attained in the first quarter of 1940, and uses for fillers and unclassified purposes consumed 20 per cent. more uncalcined gypsum than in the same period last year. Sales of all classes of industrial plasters increased in the January-March period of 1941.

The outstanding feature of the first quarter was the striking increase in the demand for gypsum board. Lath sales increased 37 per cent. over the similar 1940 period and continued the strong uptrend that has persisted since 1934. Sales of wallboard, which include sheathing board, were more than double the volume sold in the first quarter of 1940, a gain resulting largely from construction of Army and Navy cantonments.



According to data collected by the National Lime Association, 70 companies in April, 1941, shipped 212,898 tons of lime (122,613 quicklime; 90,285 hydrate). Reporting companies represent 51.4 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 415,000 tons. Shipments of lime by use and grade for April, 1941, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	4,756	27,039
Building	23,680	39,124
Chemical	94,177	24,122
Total	122,613	90,285

Abides by His Campaign Pledge; Vetoes Contract

Echoes of the 1939 municipal campaign resounded through the Jamestown, New York, city hall recently, as Mayor Roberts vetoed a resolution adopted by the city council awarding a year's contract for sand and gravel to the A. & K. Builders' Supply Company.

Throughout the campaign in 1939, Mayor Roberts and his fellow candidates attacked the award of contracts to the A. & K. Builders' Supply Company.

Pioneer Producer Tells of Early Experiences

J. K. Jensen, president of the Janesville Sand & Gravel Company, Janesville, Wisconsin, in an address before his local Rotary club recently, declared that the company during its 34-year history has produced enough sand and gravel to fill 254,000 cars, or a train 2,400 miles long.

In outlining the history of the company, Mr. Jensen said that at the time the business was established practically no machinery was available and the firm had to design and build its own equipment, including a conveyor and screens designed by Mr. Jensen.

Great Northern Leases Tract in Minnesota

The Great Northern Railroad has selected a site for a large gravel pit on the L. K. Nielson tract west of Foreston, Minnesota, and a crew already has started work building a spur track to the property.

The spur will be 1,600 feet long and a large crushing and screening plant will be erected on the site shortly.

Lightning Bolt Hits Illinois Stone Plant

Lightning struck the plant of the Elmhurst-Chicago Stone Company, located near Winfield, Illinois in May, and, in the fire which followed, caused damage estimated at $20,000.

Three long belt-conveyors and a crusher house were destroyed.

Paul Frank Quarry Installs Three New Reduction Machines

The Paul Frank Quarries, crushed-stone producer with plants at North Vernon and Osgood, Indiana is making some improvements at the North Vernon and Osgood, Indiana, is mak-

A Pioneer 30- by 42-inch primary jaw-crusher and a new Pioneer 24- by

New 30- by 42-inch primary jaw-crusher.

54-inch secondary crusher were recently installed and have gone into service. An auxiliary crushing plant with a set of 40- by 22-inch rolls is being set up to produce agricultural stone and chips, using rejects from the main plant. This auxiliary plant can be operated independently of, and without interference with, the main plant.

Auxiliary crushing plant for agstone and chips under construction at Paul Frank plant.

A new Model 604 Koehring shovel also went into operation in the North Vernon quarry this Spring.

Cement Shipments at High Level But May Taper Off Later On

The demand for cement has been running at unusually high levels in recent months and shipments from the mills during the first quarter of 1941 reached 25,500,000 barrels, exceeding the previous first-quarter record of 23,799,000 barrels set in 1927.

The demand for cement will continue at a high rate for some time, although comparisons with past years will be less favorable than during the first quarter, the *New York Journal of Commerce* points out.

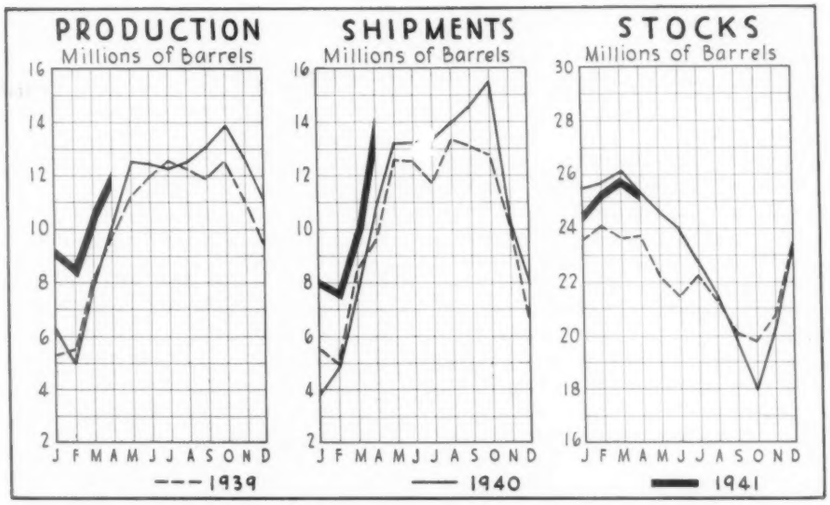
"Defense preparations are largely responsible for the current high rate of demand. Neither military construction, such as the addition of new bases for the armed forces, ammunition dumps, piers and other concrete structures, nor the erection of new factories for defense equipment is likely to continue for long at the present rate, however. Significantly, the recent appropriation of $7,000,000,000 for aid to Britain included a smaller proportion of construction expenditures than the funds previously made available for defense. Most of the appropriations were voted by Congress last fall and winter, and the desire to proceed with the greatest possible speed provided an additional reason for locating military cantonments as well as new plants in Southern states where construction could be carried on during the winter. It so happened that weather conditions were advantageous in Northern states, too.

"Second-quarter shipments for direct and indirect defense purposes, as well as for civilian construction, will again reach a large total, although the percentage rate of increase in shipments over those of last year's good second quarter will probably be only about half as large as the 55-per cent. increase experienced during the first three months. Even so, shipments during the twelve months ending June will approach 150,000,000 barrels against 130,000,000 barrels in 1940.

"During the second half of 1941 the increase over the high level of the corresponding time of 1940 will be more moderate, yet the total for the calendar year 1941 may approximate 160,000,000 barrels and about equal the level of 1930.

"The current demand pattern is working toward flattening out of seasonal fluctuations. The first quarter, always the slowest one, will show the greatest relative increase over previous years, and the third quarter, usually the period of greatest demand, will show a smaller increase than the second, so that the two may be approximately equal. While production for the year as a whole may exceed last year's total by more than 20 per cent. the peak month is unlikely to be much more than 10 per cent. above last year's high, which was registered in October and required the use of 63.7 per cent. of the industry's production capacity.

"Despite the rapid increase in demand, cement production will not establish a new record this year. There is no reason to fear any shortage of cement. In fact, the existing capacity will by no means be fully utilized. Only about one-half of it would be needed for an output equal to the shipments of 1940, and the prospective volume of 1941 would not require much more than 60 per cent. of the existing plant, could it be distributed evenly over the twelve months of the year. This, however, can not be accomplished although the industry tries to reduce the seasonal fluctuations as much as possible by accumulating inventories during the winter in order to supplement current production at the peak of demand. Despite the larger-than-seasonal shipments last winter, stocks at mills were replenished by almost 8,000,000 barrels, as against 6,000,000 barrels during the previous slack season."



The Portland-cement industry in April, 1941, produced 12,196,000 barrels, shipped 14,132,000 barrels from the mills, and had in stock at the end of the month 24,052,000 barrels of cement, according to the Bureau of Mines. Production and shipments in April, 1941, showed increases of 21.4 and 30.5 per cent., respectively, as compared with April, 1940. Portland-cement stocks at mills were 5.1 per cent. lower than a year ago. The mill value of the shipments—25,355,000 barrels—in the first quarter of 1941, is estimated as $37,341,000.

PORTLAND CEMENT SHIPPED FROM MILLS IN THE UNITED STATES IN THE FIRST QUARTER OF 1941 WITH ESTIMATED MILL VALUE, BY STATES AND BY DISTRICTS

State	Shipments (First quarter of 1941)		
	Number of Shipping Plants	Quantity (*barrels*)	Estimated Mill Value
Alabama	6	1,464,000	$2,143,000
California	11	3,902,000	5,171,000
Illinois	4	640,000	955,000
Iowa	5	335,000	563,000
Kansas	6	809,000	1,248,000
Michigan	9	1,026,000	1,404,000
Missouri	5	783,000	1,244,000
New York	11	1,509,000	2,129,000
Ohio	9	1,009,000	1,352,000
Pennsylvania	25	4,658,000	6,485,000
Puerto Rico	1	85,000	153,000
Tennessee	6	1,097,000	1,635,000
Texas	10	2,128,000	3,509,000
Other States	44	5,910,000	9,350,000
	152	25,355,000	37,341,000
District			
Eastern Pa., N. J., & Md.	22	4,677,000	6,490,000
New York & Maine	12	1,559,000	2,211,000
Ohio, Western Pa., & W. Va.	18	1,879,000	2,538,000
Michigan	9	1,026,000	1,404,000
Wis., Ill., Ind., & Ky.	11	2,135,000	3,251,000
Va., Tenn., Ala., Ga., Fla., & La.	18	4,155,000	6,283,000
Eastern Mo., Ia., Minn., & S. Dak.	11	1,117,000	1,817,000
W. Mo., Nebr., Kans., Okla., & Ark.	12	1,549,000	2,395,000
Texas	10	2,128,000	3,509,000
Colo., Mont., Utah, Wyo., & Idaho	8	503,000	928,000
California	11	3,902,000	5,171,000
Oregon & Washington	9	640,000	1,191,000
Puerto Rico	1	85,000	153,000
	152	25,355,000	37,341,000

Accident Severity Higher Among Lime Plants Last Year

The National Lime Association safety contest of 1940, the sixth yearly contest among lime producers conducted by the Bureau of Mines in coöperation with the National Lime Association, covered nearly three-quarters of a million man-hours of work more than was represented by the safety contest of 1939. Enrollment in the 1940 contest represented 43 plants, a gain of 2 over the preceding year. Five of the 43 plants were enrolled for the first time; 11 of the 43 plants had accident-free records in 1940 and they reflected plant-operation for a period of time equal to 935,113 man-hours.

In accordance with the contest rules, all plants whose records were free of accidents in 1940 were awarded certificates of honor by the National Lime Association. The plants awarded such certificates and the number of man-hours operated were as follows:

Cedar Hollow plant, Devault, Pennsylvania, operated by the Warner Company, 317,021 man-hours.

Oranda plant, Strasburg, Virginia, operated by the National Gypsum Company, 98,552 man-hours.

Knoxville plant, Knoxville, Tennessee, operated by the Standard Lime & Stone Company, 98,475 man-hours.

Reddick plant, Reddick, Florida, operated by the Dixie Lime Products Company, 84,861 man-hours.

Dittlinger plant, New Braunfels, Texas, operated by the United States Gypsum Company, 76,520 man-hours.

Thomaston lime plant, Thomaston, Maine, operated by the Lawrence Portland Cement Company, 73,574 man-hours.

Thomasville plant, Thomasville, Pennsylvania, operated by the J. E. Baker Company, 58,036 man-hours.

Marblehead plant, Marblehead, Illinois, operated by the Marblehead Lime Company, 35,475 man-hours.

Newala plant, Newala, Alabama, operated by the Newala Lime Works, 34,212 man-hours.

Thornton plant, Thornton, Illinois, operated by the Marblehead Lime Company, 31,653 man-hours.

Houston plant, Houston, Texas, operated by the Haden Lime Company, 26,734 man-hours.

It is to be noted that the Cedar Hollow plant operated by the Warner Company had the most outstanding record in 1940 in the group that operated more than 100,000 man-hours. This plant worked 317,021 man-hours without a lost-time injury. In 1939 it also had a perfect safety record, and in the past two years has operated 554,632 man-hours.

In the group that operated fewer than 100,000 man-hours, the Oranda plant operated by the National Gypsum Company had the best record.

Accidents in 1940 were more numerous and severe than in any other year since the contests have been conducted. The combined accident-frequency rate in 1940 was 30.707, and the accident-severity rate was 6.244. The five fatal accidents chargeable with 30,000 days of disability and the six permanent partials chargeable with 7,440 contributed heavily to the high accident-severity rate. If the days of disability from fatalities were not included with the 1939 and 1940 figures, the resulting 1940 accident-severity rate of 1.728 would be more favorable when compared with the resulting 1939 rate of 1.474.

A recent shift in personnel at the Gosport Gravel Company plant, Gosport, Indiana, advance Guy Carothers from plant superintendent to the post of general manager and places Ken Rector of Bloomington in charge of sales.

Flash Flood Causes Damage to Craft in River at Pittsburgh

In Pittsburgh, while employees tried vainly to attach emergency lines, a rare flash flood in June loosed the *Steel City*, a stern-wheel steamer, and the 10-year-old *Poppy*, a Diesel-motored boat owned by the Iron City Sand & Gravel Company and carried them side-by-side down the Monongahela River to crash into a pier of the Pennsylvania Railroad bridge above the famous Liberty bridge.

Eugene Potts, marine superintendent of the company, estimated the loss at about $100,000. Three sections of a floating dry-dock also went down the river.

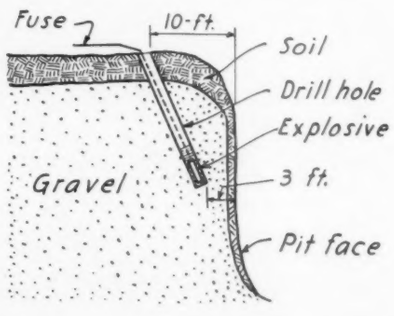
About the same time the river current loosed from the landing of the Pittsburgh Gravel Company nine steel barges valued at $15,000 each and loaded with sand and gravel. A towboat crew from the Dravo Corporation's works at Neville Island recovered four barges which swept over the Emsworth Dam. One of the barges struck the dam and sank, two snagged on the dam, and a fourth struck a sand bar.

Sloping Pit Faces with Explosive Charges

By F. R. COZZENS

Gravel pits are treacherous, and despite engineering skill in keeping faces sloped properly, there is always the risk of slides and cave-ins which endanger lives and property. In the Ohio valley inland gravel pits, where faces extend from 20 to 80 feet in height, the facing is being done without the usual risk of after effects by a method of selective blasting.

The principle is to sink a drill hole at an angle, down through the layer of soil which covers the bed, and into the gravel until the bottom extends about one-half the distance through the bed. The hole is usually started 10 feet back from the face, so that the bottom, by means of the angle, reaches to within approximately 3 feet of the surface of the face, half-way down. Into the bottom of the hole is pushed, by means of pole, one 1¼- by 8-inch cartridge of straight n.g. dynamite, 60 per cent. strength. The cartridge is connected with fuse and cap, and the hole stemmed about one-third of its depth with clay. Firing is done either with a fuse or by a wire and an electric cap, depending upon the facilities at the pit.



The action of a blast, placed in this position, is to lift out the head between the bottom of the shot hole and the pit face, which undermines the top portions of gravel, allowing them to slide in immediately from sheer weight. This leaves a firm, sloping upper surface which has not been shaken from vibrations, as is the case where explosives are fired the entire length of the drill-hole. Neither are explosives wasted in "blow-outs" which often happen in gravel in straight drill holes. When the spoil has been loaded and cleared away, the same method of blasting is repeated for a fresh supply. One blast is usually sufficient, at one time, for a pit face 10 feet in width. In larger pits the holes may be drilled 10 feet apart sloping at an angle toward the pit face, the degree of angle being determined by the depth or length of the face. The bottom of each hole should extend in all cases to within 3 feet of the face for most efficient results.

Association Clears Up Another Point in Wage-Hour Law

During recent months some field inspectors of the Wage and Hour Division have been advising crushed-stone producers that their employees engaged in the production of crushed stone for use within the state of production for maintaining, repairing, and reconstructing highways or other instrumentalities of commerce are engaged in the production of goods for commerce and are accordingly within the coverage of the Wage and Hour Law. Such rulings by field inspectors have not been, in the opinion of the National Crushed Stone Association, in accord with the position taken by the Wage and Hour Division officials in Washington.

Therefore, the association sought an official clarification of the question from the Wage and Hour Division. Summed up, the official statement was as follows:

"Employees engaged in producing materials such as sand, gravel, asphalt, concrete, macadam or railroad ties, to be used solely within the state in the construction, maintenance, repair, or reconstruction of essential instrumentalities of commerce do not become subject to the Act merely by reason of the use to which such products are put.

"A typical case is that of an employer who has contracted to repair a highway and has leased a gravel pit near the location of the job. In the pit his employees are engaged solely in digging gravel which is to be used within the state in the repair of the highway. Such employees are not 'engaged in commerce' since their operations are of a local nature and are distinct from the construction, repair and maintenance activities in which the materials are used. Neither are such employees engaged in producing goods for commerce.

"Of course, if such employees engage in certain road repairing activities, such as spreading materials on the road bed or rolling and pressing the road surface, their employment would be covered under the principles expressed in paragraph 13 of Interpretative Bulletin No. 5."

Smoot Workers Strike Again; Win Pay Boost

More than 250 workers of the Smoot Sand & Gravel Company of Washington, D. C., participated in a five-day strike in May which had threatened to tie up all construction in the Washington area.

The strike was settled when an agreement, reached by union and company negotiators in session with Labor Department Conciliators Frank J. Sheehan and Howard T. Colvin was ratified by a close vote of union membership.

Wage increases of from 3 to 10 per cent. for all workers are provided in the agreement, with shorter hours for many employees.

Bentonite Output in Wyoming Increasing

The 1941 taxable valuation of bentonite produced in Wyoming last year was $214,000 as compared with $175,000 taxable value for 1940 on the 1939 production, according to the Wyoming state board of equalization. Bentonite production in the state has been growing rapidly in the past two years. Other pit and quarry products on which an increase in production was noted for last year included gravel and limestone. The 1941 taxable valuation on all items classified as miscellaneous minerals was $2,571,076 as compared with $1,924,718 in 1940.

Leading Industrial-Sand Producer Is Observing Centennial

The Whitehead Brothers Company of New York City, producer of industrial sands, is observing its centennial this year. Samuel Whitehead, the founder, came to this country in 1820. While farming in New Jersey in 1841, he uncovered an excellent grade of molding sand which soon replaced the foundry sand which was brought from abroad as ballast on sailing vessels.

In 1850 as the business grew, Samuel Whitehead's sons left their occupations, joined their father and extended the operations and sales. Charles and William continued in New Jersey. John pioneered to Long Island, then in the Hudson River valley. James went to the Albany district, later followed by Samuel. At the time of the Civil War shipments from the several producing places were quite extensive to foundry centers along the Atlantic seaboard and inland. The American Facing Company was added to produce foundry facings. The business was conducted under various co-partnerships among the brothers and their associates. In 1892 these were thrown together and incorporated under the present name.

Today the company is the largest producer of foundry and industrial sands in the country, operating 52 plants. Descendants of Samuel Whitehead, representing the third, fourth and fifth generations are connected with the company.

A change in management has been announced in the former Walsh & Couch Gravel Company, now known as the C M C Gravel Company at Grayville, Illinois. Lawrence L. Cowling and Charles A. Mayes have purchased the interests of Claude Walsh and Charles F. Couch will be in charge.

An interesting and money-saving idea is being used by the L. B. McLeod Construction Company at its limerock mine near Williston, Florida. A LeTourneau rooter and bulldozer, working from the same Caterpillar tractor, are loosening and delivering limerock to shovels and drag-lines. This method is reported to be saving six cents a ton over the old method. Blasting, loading and hauling were formerly employed.

CURRENT BUSINESS INDICATORS

Industrial Activity Gains Impressively

The pace of industrial activity has quickened in a spectacular fashion in recent weeks. Following the settlement of the principal labor difficulties that featured the month of April, the trend of business was almost steadily upward during May. For the month as a whole the Federal Reserve Board's composite index of production in manufacturing and mining stood at 148 per cent. of the 1935-39 average. This represents a gain of 9 points over the average for April and is a full 29 per cent. higher than in the corresponding month of last year.

Further impressive gains were made during the early weeks of June and all signs point to an even more rapid advance in the rate of industrial output during the next few months as an increasing number of new defense plants swing into full-scale production. Indeed, the *tempo* will have to be stepped up appreciably if we are to come within hailing distance of the defense program that has now been delineated. Present plans call for the expenditure of over 40 billion dollars during the calendar years 1941 and 1942. Of this total, no less than 17 billion dollars is scheduled to be spent during the current year. Up to the first of June we had succeeded in spending only about 5 billion dollars. This means that during the remainder of the year the rate of defense expenditures must average somewhat in excess of 1.7 billion dollars a month. Throughout 1942, moreover, the monthly rate of defense expenditures must average close to 2 billion dollars.

With these figures in mind it is hardly an exaggeration to say that industry has just begun to feel the impact of the defense program. Even with scheduled military production proceeding at no more than half speed, industry is experiencing acute growing pains and normal civilian requirements have been forced into the background. Already sweeping mandatory priorities have been applied to a large number of basic raw materials and new items are being added to the priorities critical list almost daily. For items on this list not only are contracts placed by the Army and Navy given mandatory priorities, but, if the O.P.M. so orders, contracts for goods for Great Britain or any other nation a beneficiary under the Lease-Lend Act must be filled ahead of regular civilian business. Outstanding examples of the materials that have been blanketed under mandatory priority control in recent weeks are copper, zinc, polyvinyl chloride, and all synthetic rubber. A number of other materials are certain to be added to the list within the course of the next month or six weeks.

Nor is the present stringency confined to basic raw materials. It appears almost certain now that transportation facilities will be inadequate to handle the load that is expected to materialize in the late summer and early fall of this year. Considerable concern has also developed in recent weeks over the power supply, particularly in the Southeast, where drought conditions have seriously curtailed production of hydroelectric plants. Finally, acute shortages have developed for certain types of labor and this situation threatens to become still more serious during the next few months.

Although the months ahead are riddled with uncertainties, one encouraging feature of recent weeks is that the epidemic of labor controversies that hampered defense production during the early months of the year appears to be definitely on the wane. By his decisive action in the case of the strike at the plant of the North American Aviation Company at Inglewood, California the President has indicated emphatically that strikes that interfere with defense production will not be tolerated in the future. The President's action in this case has won the overwhelming support of the Congress and from now on strikes and lockouts in defense industries are virtually certain to be settled by compulsory mediation.

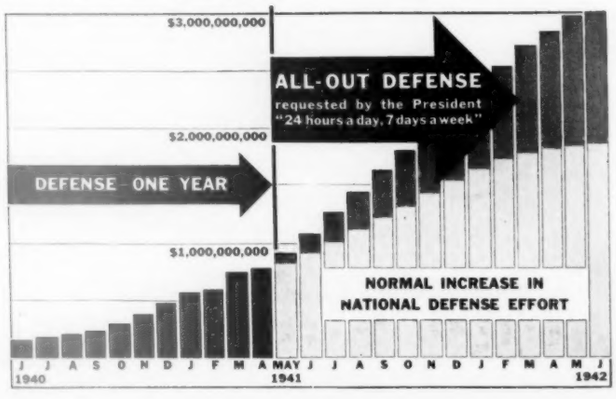
Another noteworthy development of the past month was the sharp rise that occurred in construction. According to F. W. Dodge Corporation, construction contracts in May were the largest for any month since June 1930. Total contracts for the month amounted to $548,700,000, an increase of 35 per cent. over the preceding month and 65 per cent. over the corresponding month of last year. Despite this record, the immediate future for the construction industry is not especially bright. There is a tremendous demand for residential building in many parts of the country, but a large share of this demand is almost certain to be sidetracked as many of the materials used in home construction will be required in direct defense uses. Even heavy construction is likely to be restricted rigidly to defense requirements.

Crushed-Stone Directors to Meet on July 10

The midyear meeting of the board of directors of the National Crushed Stone Association will be held at the Homestead, Hot Springs, Virginia, according to an announcement by J. R. Boyd, administrative director.

The date is July 10.

MONTHLY DEFENSE SPENDING—THE SECOND YEAR


$3,000,000,000
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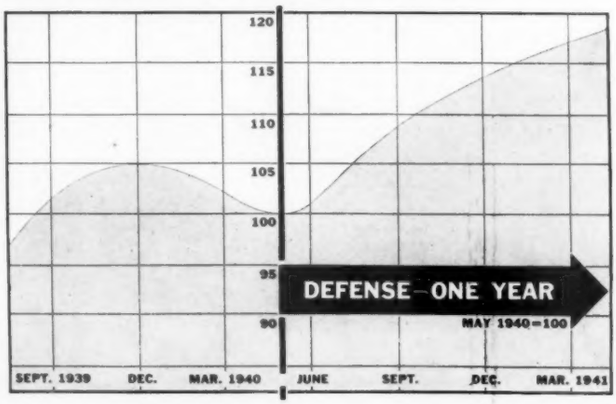
ALL-OUT DEFENSE
requested by the President
"24 hours a day, 7 days a week"
DEFENSE—ONE YEAR
NORMAL INCREASE IN
NATIONAL DEFENSE EFFORT
J J A S O N D J F M A M J J A S O N D J F M A M J
1940
1941
1942

EMPLOYMENT (MANUFACTURING INDUSTRIES)



INCREASED EMPLOYMENT FOR ENGINEER-MEMBERS ON CONCRETE TRUCK-MIXERS SOUGHT BY UNION

President William E. Maloney of the International Union of Operating Engineers (A.F. of L.) has instructed all local affiliated unions to negotiate agreements with operators of ready-mixed-concrete trucks "which will provide for the employment of as many engineers . . . as will be reasonably necessary to operate the equipment furnishing motive power to concrete mixers mounted on trucks, tractors or other conveyances." These instructions followed the affirmation by the United States Supreme Court on April 7 of the decision of Federal Judge Philip L. Sullivan of the Illinois District Court on February 4 holding the union "immune from prosecution under the Sherman Act," under which the government had sought, in its indictment of June 24, 1940, to prove the union guilty of restraining interstate commerce. The letter, which reviews the decisions and the facts, follows:

TO ALL AFFILIATED LOCAL UNIONS:

"Your attention is directed to the fact that at the Convention of the American Federation of Labor held at Norfolk, Virginia, November 11 to 23, 1907 Resolution 124 was adopted which provides among other things, as follows:

> RESOLVED, That Hoisting and Portable Local Unions of the International Union of Steam Engineers have jurisdiction over the motive power of all derricks, cement mixers, hodhoists, pumps and other machines used on construction work . . .

"The jurisdiction thus assured was confirmed by the Executive Council of the American Federation of Labor at its meeting at Miami, Florida, in January, 1938.

"For some years past our various local unions throughout the country, except in the Chicago area, have not been active in protecting this jurisdiction in respect of concrete mixers which are mounted on trucks commonly called "truck-mixers." In Chicago and vicinity, which is known among contractors as the Chicago area, the local unions have steadfastly resisted encroachments upon this jurisdiction and to that end have insisted, under threat of strikes to enforce their demands, that contractors who use truck-mixers on a job shall employ as many local union engineers as may be reasonably necessary to operate the equipment furnishing the motive power to concrete mixers mounted on trucks, tractors or other conveyances.

"These requirements were alleged to constitute a violation of the Sherman Anti-Trust Act in an indictment returned June 24, 1940 in the District Court of Illinois, Eastern Division in Case No. 32271, entitled *United States of America v. International Union of Operating Engineers, William E. Maloney, et el.* International Union of Operating Engineers demurred to the indictment, thereby challenging the contention of the government that these requirements constituted a violation of the Sherman Anti-Trust Act. Briefs were filed and extended arguments made by the respective counsel and on February 4, 1941, Hon. Philip L. Sullivan, district judge, decided against the contention of the government and in a written opinion then filed said among other things, the following:

> It appears that truck-mixers are concrete mixers mounted on trucks, which either mix the cement or agitate premixed cement *en route* to a job, while 'the other type of mixers' are located at the job site and may be mounted on tractors or other conveyances which move about the job site, or are stationed at some fixed place on the job site. One type mixes or agitates the ingredients while going to the job site, while the other type operates and does the mixing only at the job site, where it has been the practice to employ a member of the International Union of Operating Engineers to operate them. Use of truck-mixers attempts to do away with the services of this engineer, who has for years had jurisdiction of the operation of 'the other type of cement mixers.' The indictment alleges, and the government contends, that the use of truck-mixers would result in a saving of labor costs through reduction of the number of men employed. Defendants insist that this is exactly what they are objecting to, and the purpose of the strikes, or threatened strikes, was to compel cement contractors, in the Chicago area to accede to the union's demands that the services of these engineers be retained on jobs where truck-mixers are used; that these are activities within the legitimate objects of a labor union. That these activities grew out of a 'jurisdictional labor dispute' between the members of the International Union of Operating Engineers Local 150, whose members operate the mixers, and the Teamsters' and Chauffeurs' Union, whose members operate the trucks, in which dispute the engineers' union has refused to relinquish jurisdiction over truck-mixers, which are essentially concrete mixers, and over which the union has for years had jurisdiction. There appears to be nothing unreasonable in these demands, and only lawful means seem to have been used to accomplish them. I am of the opinion that defendants, under such circumstances, are immune from prosecution under the Sherman Act, by reason of the provisions of the Norris-LaGuardia Act, which enlarges the scope of Section 20 of the Clayton Act. . . .
>
> It must clearly appear from the indictment that the activities with which the defendants are charged are such as unreasonably restrain interstate commerce and prejudice the public interests, and are not activities which come within the normal, legitimate and lawful activities which may be employed by a labor union, and which, under Sections 6 and 20 of the Clayton Act, and the Norris-LaGuardia Act, are exempt from prosecution under the Sherman Act. Such normal, legitimate and lawful activities of a labor union include the calling of strikes or threatening to call strikes, in order to enforce their demands, as in the present case a demand against the use of labor-saving devices which will displace their members; or, in the alternative, the demand that if the labor-saving device is used the same number of men be employed as would be if the other type of mixer were used. These are legitimate and lawful activities which a labor union is permitted to carry on in an effort to maintain employment and certain working conditions for its members, and any restraint of trade or commerce attendant thereon is only indirect and incidental. Nothing unreasonable appears in the demands of the engineers' union. It has for many years had jurisdiction of concrete mixers, and it has as much right on the one hand to demand that its members continue to operate the mixers, as the Teamsters and Chauffeurs' Union on the other hand has the right to demand that its members now be permitted to operate the trucks. . . .

"From Judge Sullivan's decision the government appealed to the Supreme Court of the United States which affirmed the district court on April 7, 1941.

"Inasmuch as the demands of the local unions in the Chicago area have been judicially held to be not unreasonable I, as your general president under the authority vested in me by the Constitution and Laws of the International Union of Operating Engineers, hereby direct you, as I am this day directing each and every local union throughout the United States, to negotiate agreements with your local contractors which will provide for the employment of as many engineers, who are members in good standing of your local union, as will be reasonably necessary to operate the equipment furnishing motive power to concrete mixers mounted on trucks, tractors or other conveyances. You are authorized to use all your economic power if necessary to obtain such agreements. You will understand and kindly so provide in the agreements that they will be effective temporarily only and may be rescinded unless and until they shall have been submitted to and approved by the general president. This supervision of the agreements by the general president will enable him to insure in them a measure of uniformity throughout the country and will enable him also to determine that the requirements therein provided are reasonably suited to your local conditions. Upon submission of these agreements to the general president he will make such alterations, modifications and additions as he may deem proper.

WM. E. MALONEY
General President."

Gypsum Strike Threat Averted by Agreement

A strike of about 400 C.I.O.-affiliated employees of the United States Gypsum Company plant has been averted at Oakfield, New York, according to Field Representative Herman Clott of the United Mine Workers, District 50, who declared that the union felt satisfied with a reported company agreement to negotiate a contract on a national scale.

Mr. Clott said the company had previously expressed a preference for bargaining individually with each of the 10 scattered gypsum plants. National developments will determine the action of Oakfield workers, Mr. Clott explained.

An agreement affecting 260 employees of the Lehigh Portland Cement Company at Oglesby, Illinois, provides a wage increase of 5½ cents an hour.

EDITORIAL

Defense for War—VI

THE invasion of the U. S. S. R. by German forces caused no astonishment among those who have learned from long experience to mistrust Hitler's solemn affirmations of good-will and peaceful intentions. It was but another step—and there is no good reason for supposing it to be the last—in a long series of misstatements, deceits, and double-dealings. From that distant day in 1922, when he assured the Minister of Bavaria in these words, "I give you my word of honor that I will never in my life make a *Putsch*," to his pledges given the Belgian people late in 1939—less than nine months before his army invaded their country—it has been impossible to believe the utterances or official writings of members of the Nazi party. Is it any wonder that the German-Russian friendship pact, which caused world-wide consternation when it was signed and which bound each party for ten years to refrain from using force against the other, should have been violated when it suited German plans?

"The German government intends not to sign any treaty which seems to it incapable of fulfillment, but it will scrupulously maintain every treaty voluntarily signed, even though it was concluded before its accession to power and office." So said Hitler in his Reichstag speech of May 21, 1935.

Yet the Concordat of July 20, 1933 with the Holy See has been violated continuously since the day it was signed.

The non-intervention agreements with regard to Spain made in 1936 and 1937 have been violated continuously since the dates of their signing.

The ten-year agreement between Germany and Poland, dated January 26, 1934, was denounced by Hitler on April 28, 1939 and Poland was invaded on September 1.

A non-aggression pact was made with Denmark on May 31, 1939 and that country was invaded on April 9, 1940.

The Netherlands government was given pledges of friendship on January 30, 1937 and on August 26 and September 21 of 1939, yet on May 10 of the following year its country was overrun.

Other instances could be added to a record that, even in such summary, is shocking to the peoples of civilized nations. To a world confused and disturbed by such wanton disregard of solemn promises Goebbels offered an explanation. "Even a treaty with the Holy See," he wrote in the *Völkischer Beobachter* of March 22, 1937 in answer to a Papal Encyclical protesting against the violation of the Concordat, "has not of itself any sacrosanct value. One may have consented to sign a treaty and then, in view of the necessity of a changed situation, say 'No.' No appeal to German 'loyalty' can have any persuasive effect as an argument. . . . German fidelity does not signify fidelity to a treaty to the point of suicide. It signifies loyalty to the German people, always and in all cases."

With regard to Austria Hitler said in his speech to the Reichstag on January 30, 1934: "The assertion that the German Reich intends to violate the Austrian State is absurd and can not be substantiated. . . . I must categorically deny the further assertion of the Austrian government that an attack will be made on the Austrian State or is even being planned by the Reich." To the same body he said on May 21, 1935: "Germany neither intends nor wishes to interfere in the internal affairs of Austria, to annex Austria, or to conclude an *Anschluss*." Despite the signing of an agreement repeating these promises, German troops entered Austria on May 11, 1938.

In the Sportpalast in Berlin on September 26, 1938 Hitler said: "I assured the British premier, and I emphasize it now, that when this problem [the Sudetenland part of Czecho-Slovakia] is solved, Germany has no more territorial problems in Europe. . . . We do not want any Czechs." And in his letter to Chamberlain the next day he wrote: "There can, therefore, be not the slightest question whatever of a check to the independence of Czecho-Slovakia." Prague was occupied by the Germans on March 15, 1939 and on April 28 Hitler addressed the Reichstag, saying, with reference to that country, that he had "never written a single line or made a single speech in which" he had "expressed any attitude contrary to" his "actions."

AND now, with regard to Russia. "We see in Bolshevism a bestial, mad doctrine. . . . I can not make a pact with a *regime* whose first act is the liberation, not of the workers, but of the inmates of jails," said Hitler in a speech on September 14, 1936. And in *Mein Kampf* he had previously written: "We must never forget that the regents of present-day Russia are common blood-stained criminals; that here is the scum of humanity, which . . . butchered and rooted out millions of its leading intellects. . . . They inhabit this world, not as the advocates of honor and truthfulness, but as the advocates of lying, deceit, theft, rapine, and plundering." And, at another place: "The fact of the conclusion of a treaty with Russia embodies the declaration of the next war. Its outcome would be the end of Germany." But such a "treaty of friendship" with Russia was signed on September 29, 1939, and now it has been violated by the German army.

This recapitulation of some of the statements and actions of officials of the German government is offered as a warning against the acceptance at their face value of Hitler's assurances of friendship for, and lack of political ambitions in, the western herisphere. There are still too many Americans who, led by the appeals of Lindberg, Coughlin and the like, still believe in the good faith of the German government.

The Russian portion of the record is presented lest we be induced by clever German propaganda to believe that, by his attack on Russia, Hitler is trying, as he claimed in his recent proclamation, "to safeguard Europe and thus save all."

It is essential to our mental defense against the tyranny of Hitler's "new world order" that we recognize, despite his blandishments, the real enemy of democratic life in the persons of Germany's leader and his henchmen rather than in what, for the purpose of deception, he has chosen to call the "scum of humanity."

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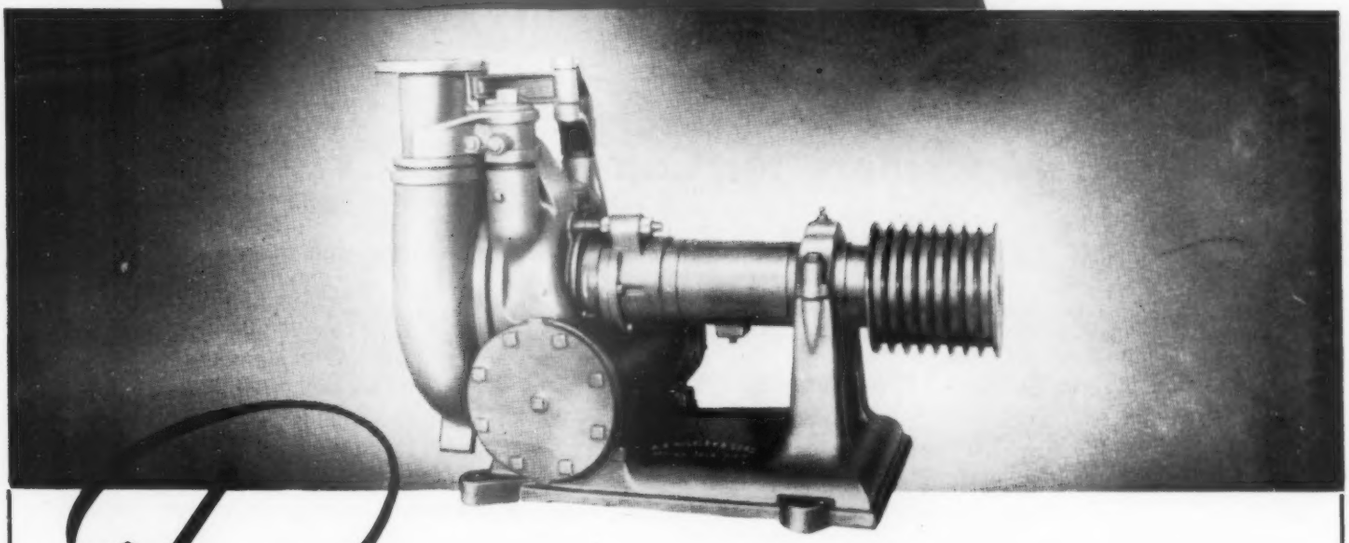

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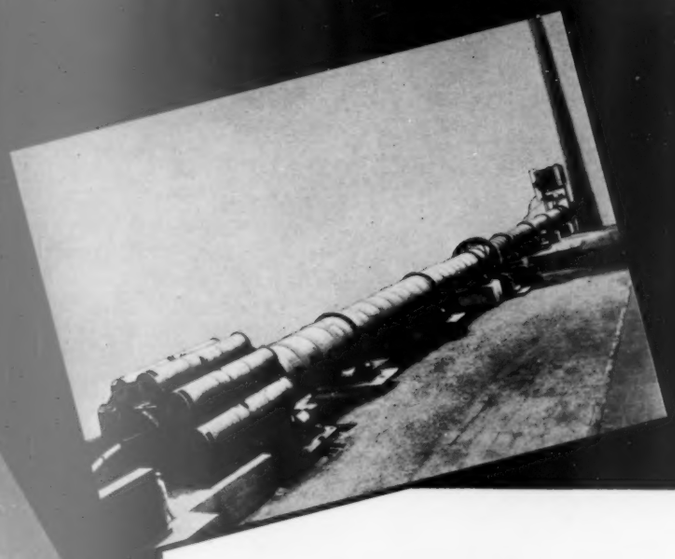

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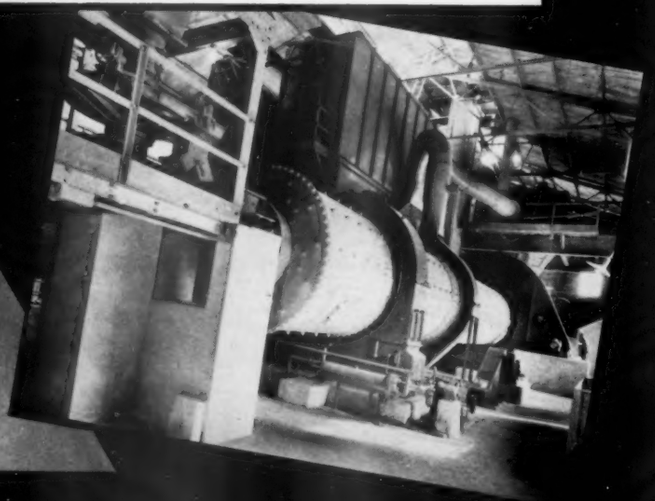

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The Union Bridge plant with chemical laboratory and change-house in foreground. Cement-storage silos and stock-house are barely visible at extreme left. Power-house and waste-heat boiler-house at right.

Efficiency Up, Operating Costs Down as Lehigh Rebuilds Union Bridge Mill

WITH the virtual completion of the rebuilding of its Union Bridge, Maryland plant, the Lehigh Portland Cement Company has demonstrated the practicability of bringing a 30-year-old plant up-to-date without abandoning all the old buildings and equipment. This work was begun late in 1938 with the construction of new cement-storage silos to supplement the original pack-house. About Christmas day, 1938, these silos were full of cement and the plant was shut down. Then work began on the electrification of the quarry, the enlargement of the crushing department, and the construction of a new power-house, a pump-house, a waste-heat-boiler department and raw-material and clinker grinding departments.

Operation of the quarry and crushing plant was resumed on June 10, 1939. On June 26 the raw-material-grinding department and the waste-heat boilers and power-plant went into operation. These were followed on July 7 by the clinker-grinding department. Late in 1940 the installation of the first of five direct-firing coal mills was begun. The last of these went into operation a few months ago. A new gypsum storage-and-handling system was also installed. The latest addition was a very modern and complete change-house for the employees.

At present a third final-grinding tube-mill and a third mechanical separator are being installed in the clinker mill. Other measures for further improvement are planned, including a new clinker cooling-and-handling system, new kiln drives, etc. Some of the abandoned buildings are to be torn down and this will contribute considerably to improving the appearance of the plant.

Some comparisons of the results obtained with the old and new plants should be of interest. The kilns formerly burned clinker with an average coal consumption of 96 pounds per barrel when making standard Portland cement. This, however, was an improvement over the fuel consumption of 112 pounds per barrel before Lehigh took over the plant. The average coal consumption at present is 90 pounds per barrel. The former coal-fired steam power-plant, however, used an additional 50 pounds of coal for each barrel of cement produced, while the present waste-heat power-plant generates all the power necessary for all the operations. All excess power is used by the local power company through a give-and-take arrangement. The total power consumption for all the operations is about 20 kilowatt-hours per barrel of cement produced.

Some of the credit for the improved burning conditions goes to the new direct-firing coal mills which also make control of the burning much easier. The high up-keep of the old coal grinding-and-drying department has been eliminated, along with the accompanying excessive loss of dust.

The old-style open-circuit vertical raw-grinding mills were capable of grinding to a fineness of only 88 per cent. through 200-mesh. The present mill is grinding to 92 per cent. through 200-mesh and can grind finer if desired.

The old open-circuit vertical finish-grinding mills could grind no finer than 92 per cent. through 200-mesh or 1,650 square centimeters per gram specific surface area. Now standard Portland cement is ground to 98 per cent. through 200-mesh with a 1,700-square-centimeter area. The old mill was incapable of producing any other than standard Portland cement. The present mill has made Types I and II and can make any of the other three types or any desired specials. A better and more uniform cement is being produced at a much lower over-all production cost.

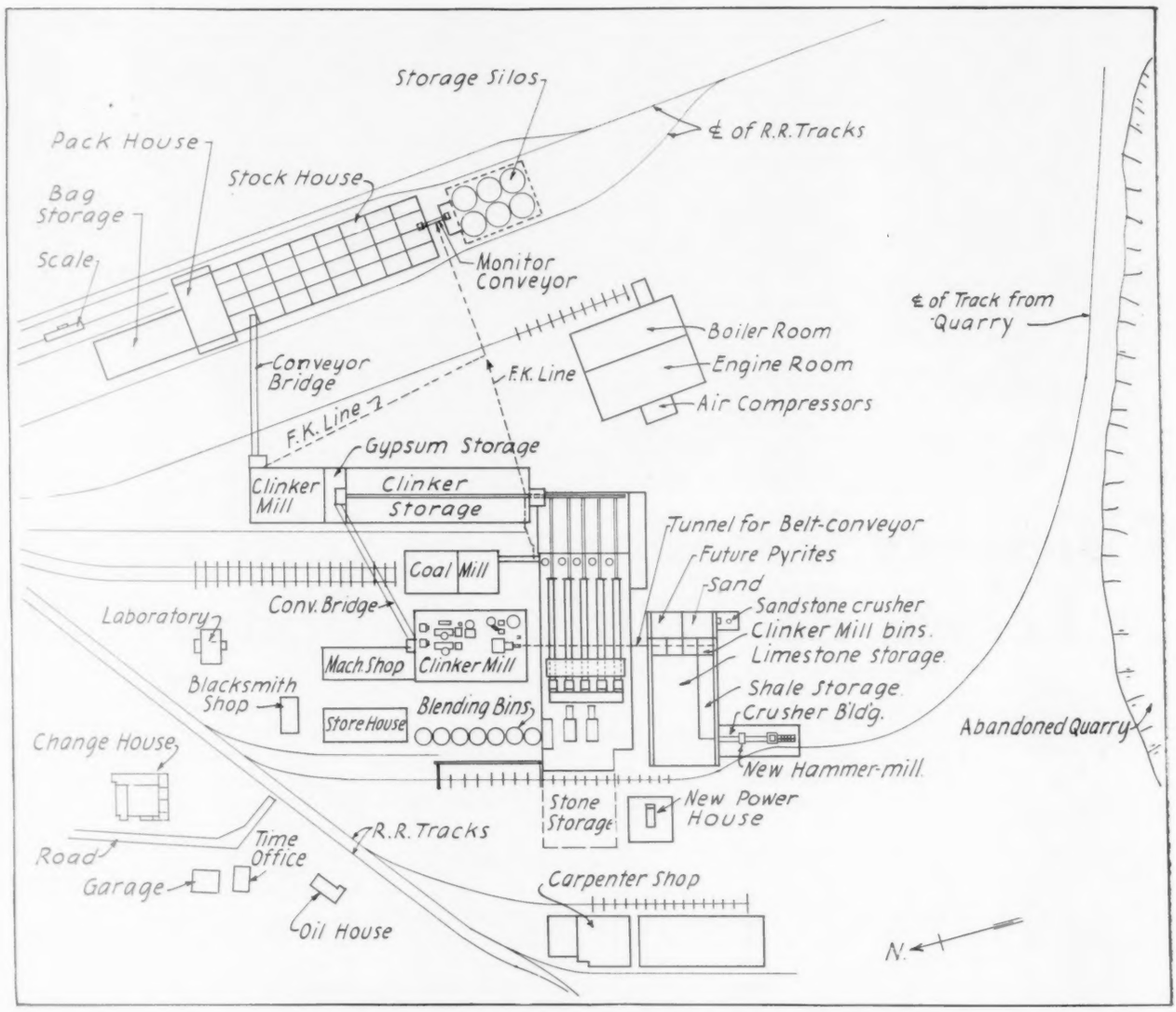
Another illustration is the fact that 650 pounds of dry raw materials was formerly required to make a barrel of cement. Now only about 580 pounds is required where the theoretical figure is 560 pounds.

The entire staff of the plant comprises 140 men including the superintendent and the office force.

The Union Bridge plant was built in 1910 and 1911 by the Republic Finance Company. On its completion it was sold to the Tidewater Portland Cement Company, which put it in operation in August, 1911 with the late Richard K. Meade as general manager. The plant originally had 5 kilns and one was added later. In 1923 a new crushing plant was built. No other important changes were made before the plant was purchased by the Lehigh Portland Cement Company in 1925 at a receiver's sale.

The original promoter also built a

By W. E. TRAUFFER



A general plan of the Lehigh operations at Union Bridge.

vertical-kiln lime plant which was abandoned after the business was taken over by Lehigh. This building is now used for bag storage and as a carpenter shop. It will soon be torn down as a part of the rehabilitation program.

The development of the present quarry was begun in 1927, when the overburden in the original quarry became too heavy for economical operation. The stripping of the new quarry was done in that year by a contractor who removed about 200,000 cubic yards of overburden from an area of about 15 acres. The original level was developed into the deposit at an elevation of 180 feet above sea level. Later another 30-foot lift was taken out and the quarry is now being expanded on this level. The stone has a $CaCO_3$ content of about 96 per cent. except at one end, where there is a streak high in silica and at the other end where the deposit is high in magnesia.

The face now being worked varies from 45 to 70 feet in height. The drilling is done by two crawler-mounted electric well-drills with 6-inch bits and ¾-inch steel cable. Quarry blasts are made in single or double rows with 12- by 14-foot or 14- by 16-foot spacings. From 30 to 100 holes are detonated at one time. Forty- and 60-per cent. explosives and Primacord fuse are used. The secondary drilling is done with jackhammers using 1-inch steel, and air is furnished by an air-cooled type compressor. The quarry is drained by an 8-inch centrifugal pump.

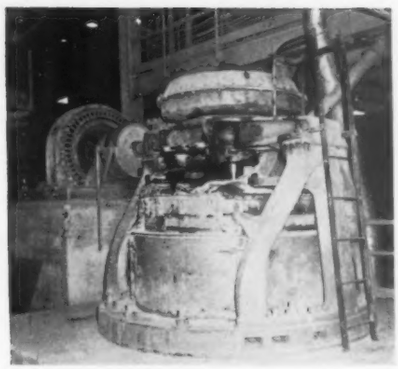
The quarry track is arranged in a loop for efficient operation. A 75-B full-revolving electric shovel with a 3-cubic yard dipper loads the stone into the 10-cubic yard side-dump quarry cars. These cars are of all-steel construction but have wooden false bottoms to absorb the impact in loading. They are equipped with roller bearings. The cars are hauled a distance of about ⅜ mile to the plant in trains of six cars each by two 20-ton Diesel-electric locomotives powered by 150-horsepower Diesel engines.

No attempt is made to blend the rock in the quarry by selective loading.

The shale used in this plant is in a folded deposit overlying the rock at one edge of the quarry. The loading is done on a sidetrack by a 50-B electric shovel with a 2-cubic yard dipper. The same cars and locomotives are used for haulage.

The silica needs are supplied from a rotten-sandstone deposit about 2½ miles from the quarry. There the loading is done by a gasoline-electric shovel with a 1½-cubic yard dipper. A truck with a special 5-ton body hauls this sandstone to the quarry near the shale deposit where it is dumped over the edge into a pile on the quarry floor. The shale shovel is used to load this material into the cars for haulage to the plant.

The quarry and crushing plant are operated five 8-hour days per week.



One of the improved grinding mills with dust-collector connection at right.

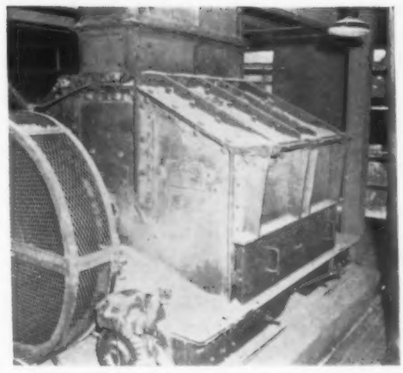
Four days are devoted to hauling rock and one to shale. The sandstone needed for a month's operation is hauled in about 6 hours. All these materials are run separately through the same processing equipment before going into the raw-material storage building.

The cars are hauled on a trestle where they discharge their contents on a 5- by 16-foot apron-feeder. The dumping is done by means of an elbow-type dumping mechanism operated by an air-hoist. The 36- by 60-inch primary single-corrugated-roll crusher reduces the material to 8-inch size and under. A 48-inch by 51½-foot inclined bucket-elevator feeds this material to a reversible hammer-mill. The product of this crusher is discharged by a 48-inch by 43-foot elevator on a 5- by 8-foot fully-inclosed vibrating screen. The 1½-inch plus oversize from this screen is returned on an 18-inch belt-conveyor to the hammer-mill.

This entire department is kept dustless by a 5-compartment cloth-bag dust-collector which is connected to the crushers, elevators, screen, etc.

The minus 1½-inch material passing through the screen drops into the raw-material storage building. This structure is 81 feet wide and 103 feet long and is surrounded by a concrete wall 21 feet high. It is divided into four main sections separated by concrete walls for the four ingredients used in this plant. The rock-storage capacity is 9,000 tons, that for shale 2,400 tons, sand-stone 1,300 tons, and iron ore 1,100 tons.

Under the screen is a split chute so the shale can be discharged through a special inclosed vertical chute direct into the shale-storage section. This chute is provided with numerous hinged gates all of which stay closed except the one at the level of the top of the pile. This system eliminates the dust nuisance usually accompanying



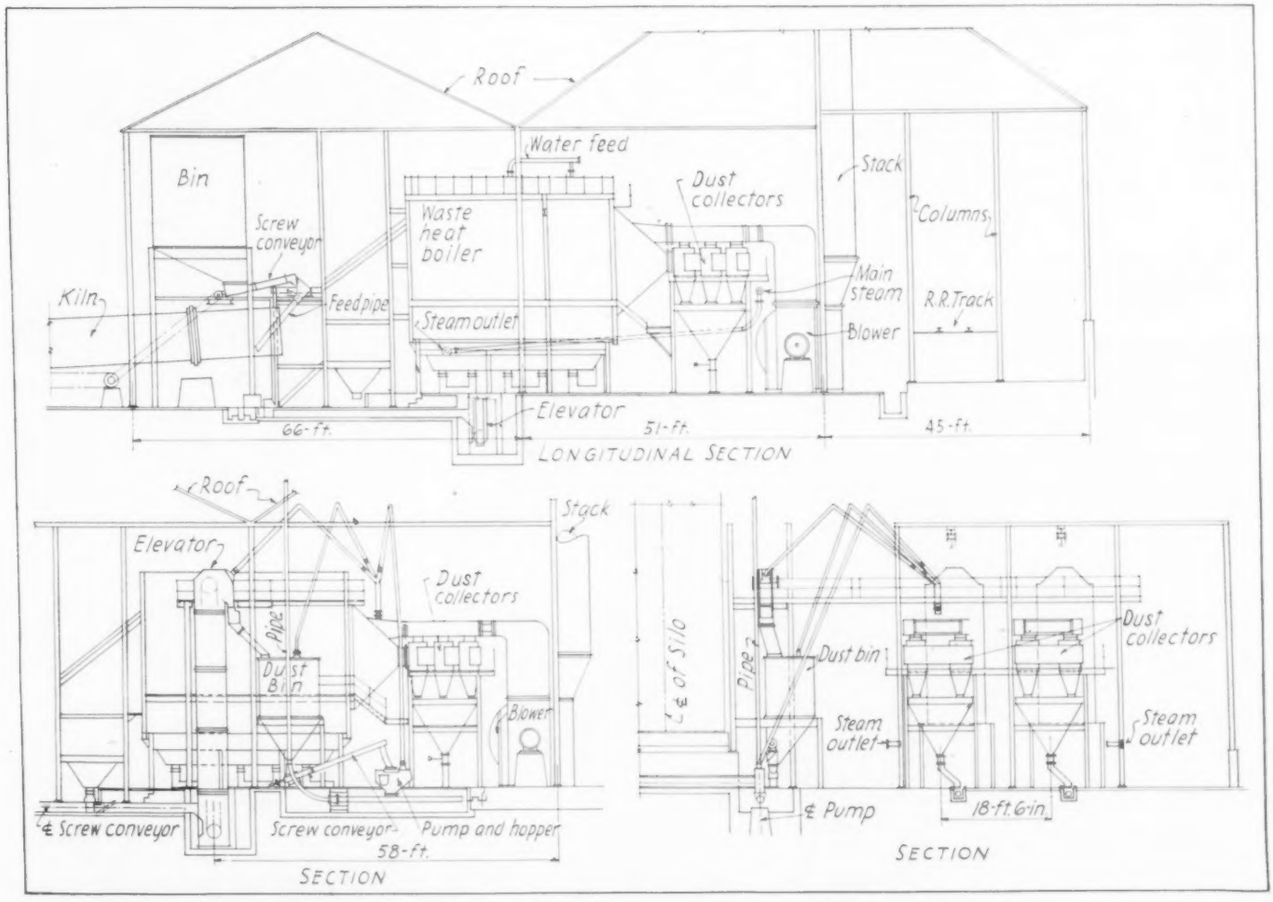
This reversible hammer-mill is employed for secondary crushing.

the use of such discharge methods.

The stone or sand is discharged through a similar chute into the stone section.

The iron ore is received in cars from which a crane loads it into trucks for transfer to the storage section.

All these materials are distributed in their various sections by an 8-ton 75-foot span overhead crane with a 3-cubic yard clam-shell bucket. This crane also transfers these materials to four 250-ton compartments arranged in a row across the storage. In the stone-storage section any high-silica rock or rock con-



Longitudinal and sectional elevations of the waste-heat boilers and related equipment.

taining clay overburden is isolated and is blended with the other rock through the ore bin whenever this is practicable.

Under these bins and extending under the kiln room to the mill room is a 24-inch by 213-foot belt-conveyor in a concrete tunnel. Thirty-six-inch apron-feeders under these bins blend the shale, ore and sand as needed on this belt-conveyor. Sand and shale only are added in making standard Portland cement. For moderate-heat cement iron ore is also added. A 20-inch by 67½-foot elevator feeds these blended materials into a 70-ton steel mill-feed bin. The limestone is handled separately and

Elbow-type hoist dumping contents of quarry car into primary crusher.

after being discharged by the elevator is fed by a 14-inch by 27-foot drag-chain conveyor into a 190-ton steel bin.

The blending of the limestone with the other mixed materials is done by two automatic electric vibrating feeders, one for the limestone and one for the other materials. Both machines are equipped with scales and they are automatically kept at constant relative speeds by individual Selsyn generators driven through a variable-speed reducer driven by a constant-speed motor. Adjustments for varying the rate of feed or proportions are made only by the chemist.

Shovel loading a train of cars in the quarry.

The feeders discharge the raw materials through a common spout to a 35-inch by 37-foot vertical bucket-elevator serving the No. 366 ball-type pulverizer. This is driven by a 600-horsepower ball-bearing motor. A 35-inch by 48-foot elevator discharges the product of the mill into the 16-foot mechanical separator which is driven by a 100-horsepower gearmotor. The separator rejects are returned by gravity to the elevator ahead of the mill for regrinding.

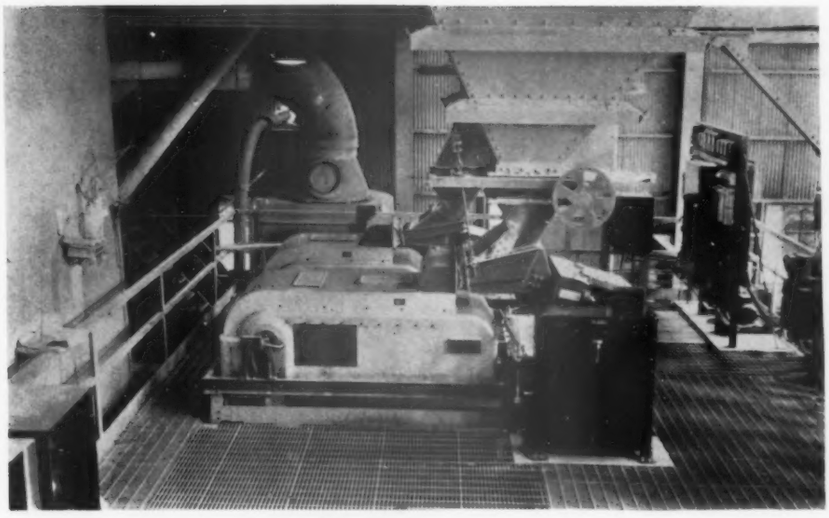
The entire grinding system is also used for drying, and the elevators, separator and piping are insulated for highest thermal efficiency. The heat for drying is supplied by a vertical furnace, which is fired with Bunker C fuel-oil by an oil-burner. This furnace supplies 5,000,000 B.t.u. of heat per hour and the heat of grinding is also utilized. The suction for the entire system is supplied by the fan of the 4-compartment cloth-bag dust-collector which is connected to all the raw-mill units.

The raw-material grinding department produces about 40 to 45 tons per hour of finished raw material containing less than ½ of one per cent. of moisture and having a fineness of 92 to 95 per cent. through 200-mesh.

The finished raw material is discharged from the separator into an 8-inch Type H Fuller-Kinyon pump, the air for which is supplied by a rotary compressor located near it. This material is pumped through a 6-inch line into any of seven blending tanks, each 20 feet in diameter by 30 feet high, with a combined capacity of 2,700 tons. Material is fed into these bins through motor-operated 2-way valves automat-

Vibrating screen which removes oversize from material going to raw storage.

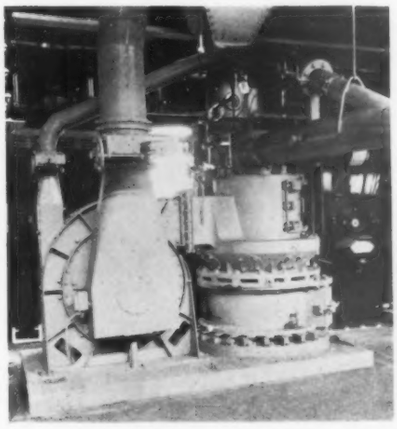
Some of the direct-firing unit coal pulverizers which serve the kilns.



Two of the raw-material feeders with scales and control board.

ically regulated by a control board.

The raw-material grinding department is run only during two 7-hour night shifts when the quarry and crushing department are not operating. Once during each of these shifts an analysis is made of the mill product to determine the points to which the mix is to be held. An analysis is also made of the contents of each blending bin as soon as it is filled. By withdrawing material from these bins in the required proportions, usually from three bins at one time, it is possible to control the



A close-up view of one of the coal-mill installations.

$CaCO_3$ content of the final mix within 0.2 per cent. either way from the desired figure. Control tests of the finished kiln-feed material are made at 2-hour intervals.

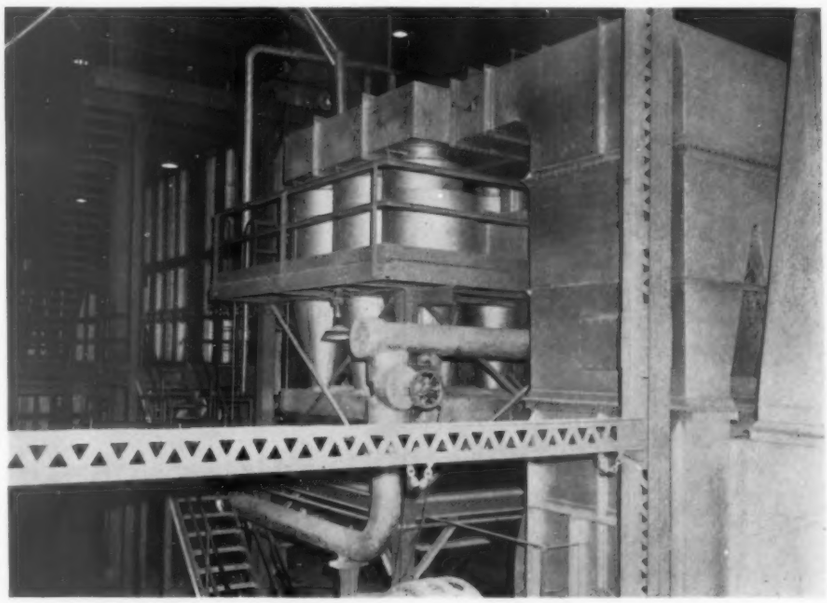
Material is withdrawn from the blending tanks through two variable-speed rotary feeders under each tank. A 16-inch-diameter screw-conveyor feeds the blended raw material into a 10-inch Fuller-Kinyon pump which is supplied with air by a rotary compressor located near it. The raw material is discharged into the five kiln-feed bins through 2-way manually-operated valves. If desired, however, the raw material can be pumped back into one of the blending tanks for reblending. The five 8- by 120-foot rotary kilns are fed by means of inclined screw-conveyors.

Each of the five kilns is connected to a unit coal pulverizer of the latest type. Each of these mills has a rated capacity of 2,700 pounds per hour of coal with a moisture content of up to 8 per cent. The 22½-inch diameter table-type feeder for each mill is mounted over and integrally with it. Each mill has a 50-horsepower motor which drives the fan direct and the mill through V-belts. The mills are mounted on rubber which prevents vibration from being transmitted to the kiln floor. The hot air for these mills is drawn from the kiln hoods through pipes equipped with inlets which automatically let in enough air from the atmosphere to keep the air going into the mill at the desired temperature and volume. The coal-feed pipes to the kilns are water-jacketed. Rubber-hose sections take up any shrinkage or expansion that occurs in these pipes.

The coal used is Pittsburgh slack with a 13,500-B.t.u. content. This is received in hopper cars from which it is discharged to a 6,000-ton storage-pile under a trestle. The coal is reclaimed from storage on a 22-inch by 228-foot belt-conveyor in a tunnel under the pile.

Raw-material grinding mill with elevator and separator in the background.

The coal is then discharged into a roll-crusher which is followed by a bucket-elevator and a 12-inch cross screw-conveyor over the five 24-ton coal-mill feed tanks. High-level indicators in these



A view showing the stack dust-collectors, superheaters, and economizers.

bins actuate lights in the tunnel to control the feed.

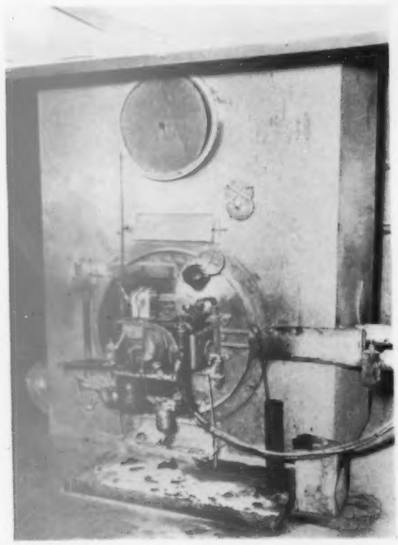
The kilns are about the same as when they were originally installed but have been improved with modern hoods, seal rings, etc. They are driven by 35-horsepower motors at from 45 to 50

The 14-foot mechanical separator in closed circuit with one of the finish tube-mills.

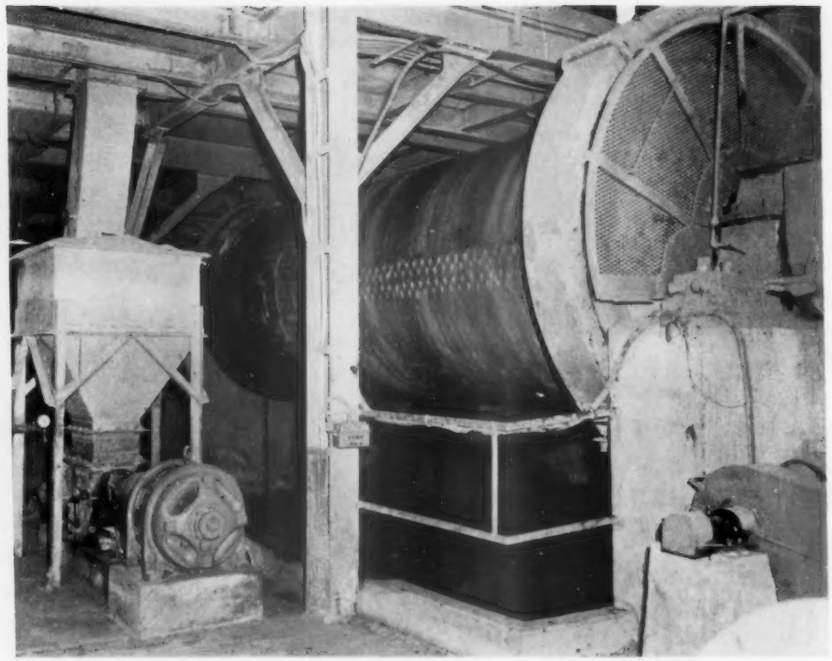
revolutions per hour. One of the next improvements to be made is the installation of the latest type of kiln drives.

The hot air and gases from all five kilns pass into a common flue with individual dampers to cut off any kilns which may not be running. The main flue splits to two Stirling 3-drum waste-heat boilers which are equipped with manually-operated dampers and feed-water regulators. Each boiler has 9,750 square feet of heating surface and operates at 450-pound designed pressure. The superheaters are of the 5-loop type with 1,800 square feet of heating area and operate at 450-pound designed pressure and 735-degree superheat. The economizers have heating surfaces of 5,300 square feet each.

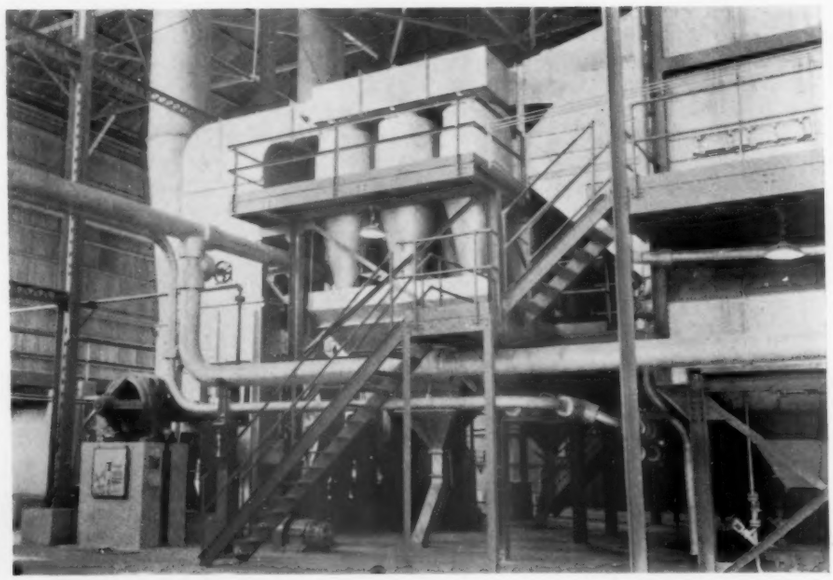
Following the economizers are two



Oil-fired vertical furnace used to dry raw material while grinding.



One of the two 6½- by 20-foot finish-grinding tube-mills. At left is the pump which sends finished cement to storage.



One of the two cyclone-type dust-collectors installed ahead of the kiln stacks.

dust-collectors, each consisting of six cyclone-type units. With all five kilns in operation these collectors recover 85 per cent. by volume of dust daily. The kiln draft is supplied by two 147-inch-diameter draft fans, each driven by a 200-horsepower variable-speed motor. These fans exhaust to the atmosphere through two 5- by 50-foot steel stacks. Between the fans and the dust-collectors are draft-control dampers actuated by an air-operated control-drive draft-regulating system.

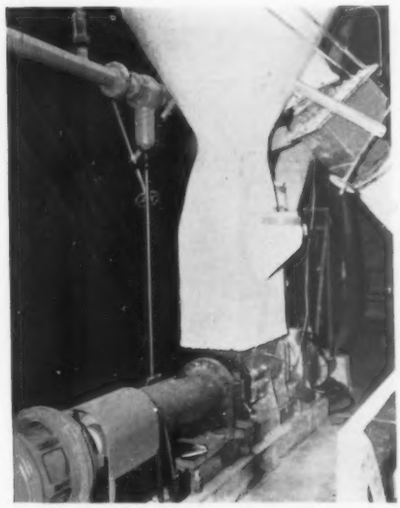
Dust from the collectors and from the pans under the boilers and flues is collected by 12-inch screw-conveyors feeding a bucket-elevator. The dust is discharged into a bin, from which it is blended back into the 10-inch Fuller-Kinyon pump which feeds raw material to the kilns.

The clinker is discharged from the kilns to five 12-inch by 89-foot drag-chain conveyors. These feed the clinker to a 12-inch by 105-foot cross drag-chain conveyor followed by a bucket-elevator. A series of three 14-inch drag-chains discharge the clinker into the storage building which was built as a part of the original plant. Plans are to install a completely new clinker cooling-and-handling system.

The storage building has a capacity of 66,000 barrels of clinker and 800

tons of gypsum. The gypsum is received in cars and a 24-inch by 119-foot belt-conveyor discharges it into storage.

Gypsum and clinker are reclaimed separately from storage by means of a 24-inch by 210-foot belt-conveyor in a tunnel under the storage. A drag-scraper is used to keep the material piled over the tunnel-feed gates. The tunnel conveyor is followed by a bucket-elevator and by 24-inch by 195-foot and



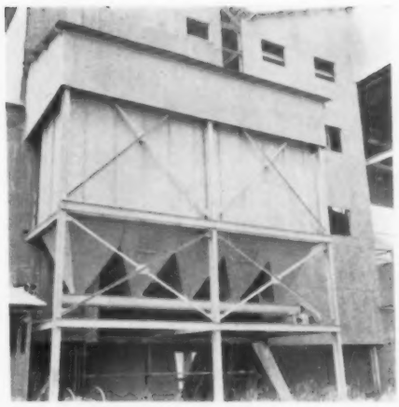
Pump which transfers finished raw material from separators to blending tanks.

74-foot belt-conveyors which supply the materials to the 32-ton gypsum and 850-barrel clinker mill-feed bins.

A 3-compartment cloth-bag dust-collector is connected to each gate in the clinker tunnel and to the elevator and belt-conveyors used to reclaim the clinker from storage.

The clinker and gypsum are discharged through a common spout into an improved-type Hercules mill, which has a capacity of 115 to 160 barrels per hour depending on the type of product, its fineness, etc. This mill is driven by a 350-horsepower Simplex synchronous motor. A series of two 16-inch screw-conveyors feed the product of this mill to a bucket-elevator from which it is discharged into a 250-barrel tube-mill feed bin.

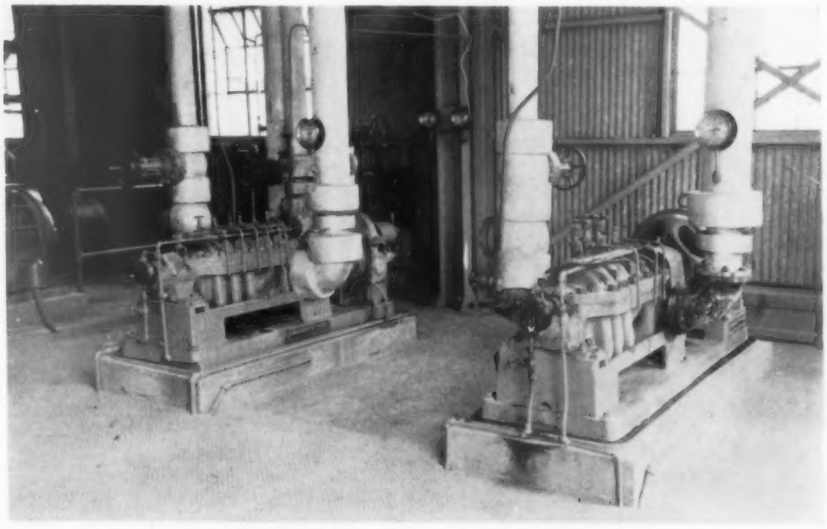
At each end of this bin is a 10-inch diameter screw-conveyor which tapers down inside the bin to 6-inch diameter so that it will pick up material for its full interior length. Each screw-conveyor discharges through an opening into a 10-inch-diameter cross screw-conveyor which has a half pitch and a cylindrical casing and is driven through a variable-speed drive. The excess material from each of the first two screw-conveyors overflows by gravity back to the elevator ahead of the mill-feed bin. This system insures an ade-



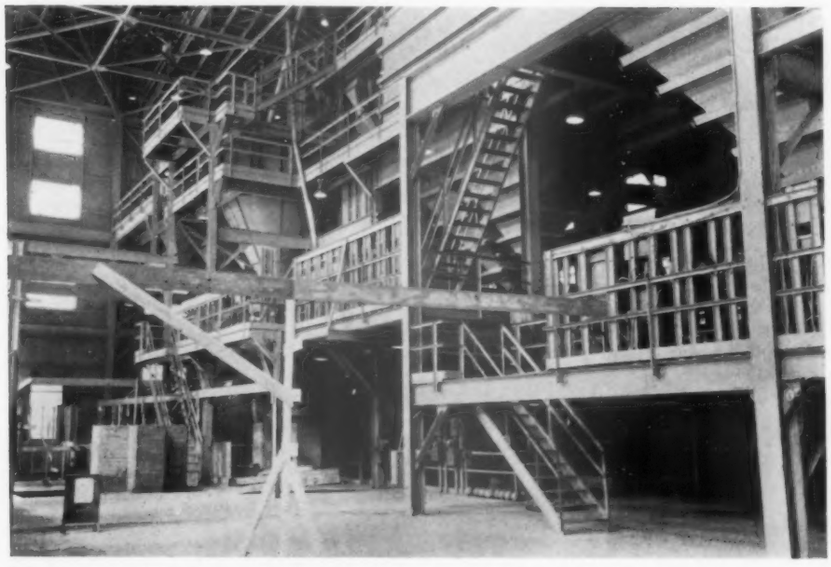
Five-compartment cloth-bag dust-collector which serves the crushing department.

quate supply of material for the mills at all times.

The two 6½- by 20-foot tube-mills are loaded with ¾-inch grinding balls



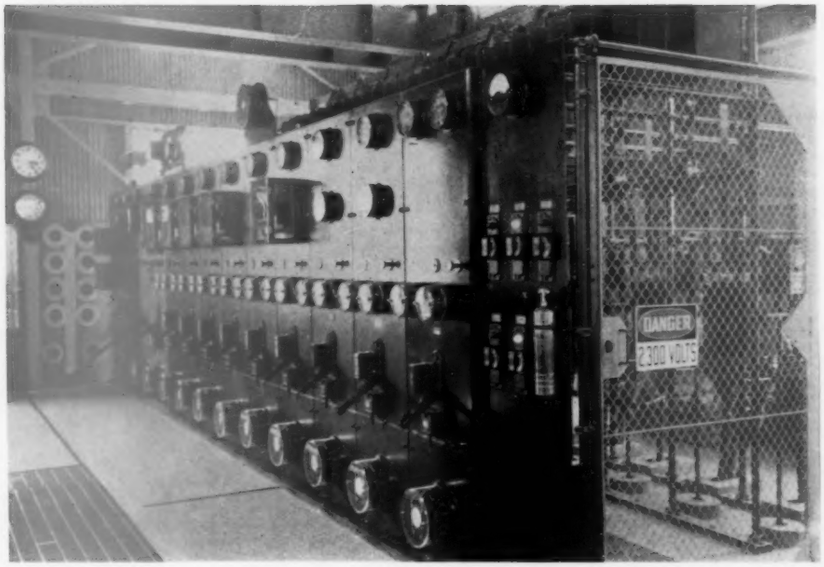
The two 6-stage pumps used for boiler feed.



A general view in the mill-room showing one of the finish tube-mills and its 14-foot separator.

and are driven by 300-horsepower synchronous motors. Their products are dropped into the ends of a right- and left-hand screw-conveyor which discharges at its center into a bucket-elevator. A split chute lets the material flow by gravity into one of the two 14-foot mechanical separators and to a screw-conveyor feeding the other separator. The rejects from each separator are returned by 12-inch screw-conveyors to the tube-mill feed screws. Each of the separators is driven by a 60-horsepower gearmotor. This grinding system has a capacity of 120 barrels per hour which is being increased to 180 barrels per hour when grinding standard Portland cement with a specific surface area of 1,750 square centimeters per gram.

The finished cement is discharged from the separators into a 16-inch screw-conveyor which feeds it to a 6-inch Type H Fuller-Kinyon pumping sys-



The main switchboard in the power-house. It controls the distribution of the power generated.

tem. The cement is pumped through a 5-inch by 800-foot line to storage. This pump is served by a rotary compressor located near it.

The clinker-grinding department is kept dustless by a 5-compartment cloth-bag dust-collector which is connected to the mills, screw-conveyors, elevators, and the discharge end of the belt-conveyor from the clinker storage.

The cement pipe-line is split so that it can discharge either into the new cement

Control panel for feeders on the raw side.

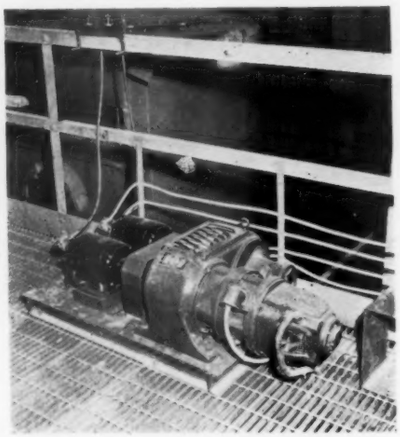
silos or into the old cement stock-house. Each of the six reinforced-concrete cement-storage silos is 75 feet high and 28 feet in inside diameter. With their two star bins they have a total capacity of 65,000 barrels. Spouts for direct loading of bulk cement are now being installed on these silos. The silos were built by the Consolidated Engineering Company.

The cement for the stock-house is discharged from the pipe-line to a 16-inch screw-conveyor which runs the full length of the building. This screw-conveyor can discharge the cement to the pack-house or through spouts into any of the 32 bins in the stock-house which has a capacity of 90,000 barrels.

Under each of the two rows of silos is a 16-inch reclaiming screw-conveyor. These conveyors discharge the cement to a 16-inch cross screw-conveyor. A bucket-elevator feeds this cement to the screw-conveyor over the stock-house for feeding to the pack-house.

The cement stored in the stock-house is reclaimed by screw-conveyors, one under each of the four rows of bins. Two cross screw-conveyors feed the cement to two bucket-elevators in the pack-house. One of these elevators can also feed to the screw-conveyor over the stock-house, which can be reversed to discharge into any of the 32 bins.

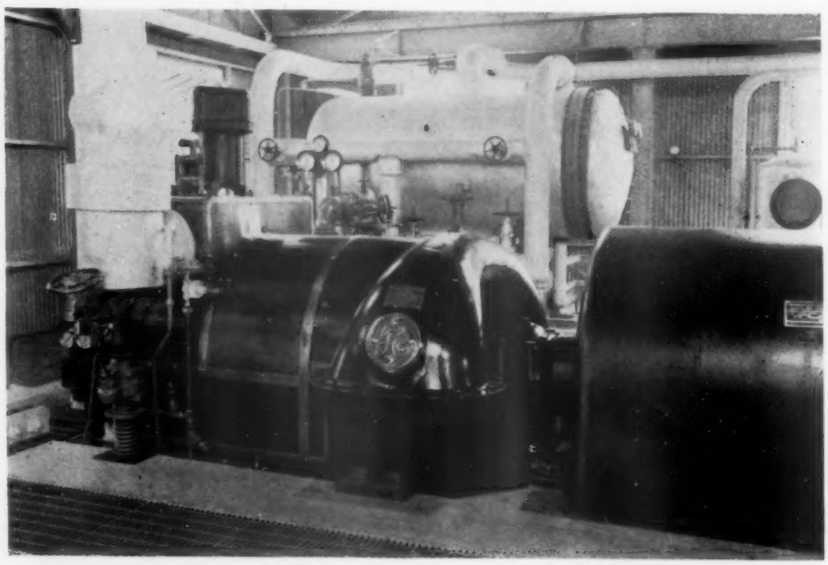
The bucket-elevators and the main screw-conveyor feed the cement into the two packer-feed bins or into a bulk-cement loading bin. The two 4-spout packers were originally served by individual belt-conveyors for simultaneous loading at both sides of the pack-house. These conveyors have been made reversible, and roller sections, which are driven from the conveyor pulleys, have been installed between them. Now both conveyors and the roller sections are operated as a unit so that



Speed-reducer driving two generators which keep the raw-material feeders synchronized.

both packers load together on either side of the building. Adjoining the pack-house is a bag-storage building in which are a bag-cleaner and other necessary equipment.

The process water used in this plant comes from the old quarry near the crusher building. The service water is withdrawn by two 500-gallon per minute centrifugal pumps. The water for the boilers and power-house is supplied by two 5,000-gallon per minute centrifugal pumps. These pumps are located



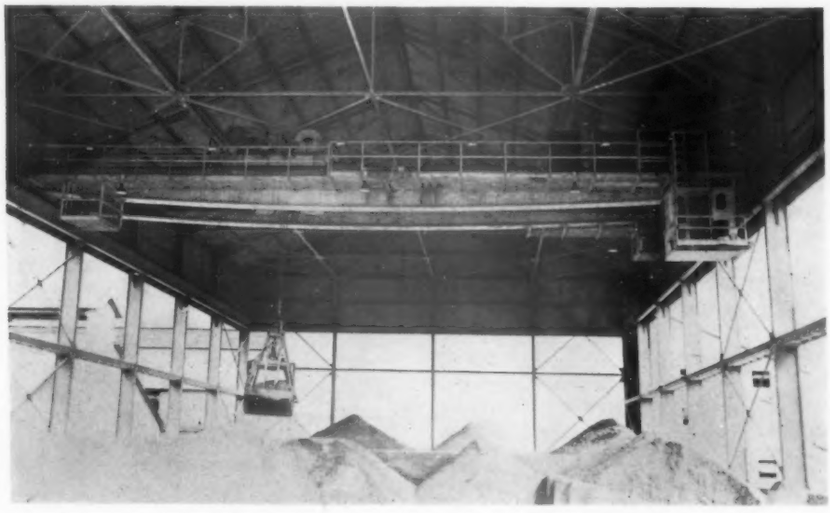
The 3,000-kilowatt turbo-generator in the power-house.

in a well so that the water is withdrawn at a point 50 feet below water level. By this means water cool enough for use in the condensers is obtained without the use of a spray pond.

Water from the condenser in the power-house can be discharged either into the pond or into a creek which runs between the plant and the pond. During dry seasons water from the creek can be diverted into the pond over a spillway which keeps out any silt.

There is an excellent fire-protection system with hydrants located at strategic points about the property. This system is connected to the service pumps and to a fire pump at the pump-house which is operated only when needed.

A view of the new, modern all-concrete change-house and locker building for the employees.



The 75-foot 8-ton overhead crane in the raw-storage building.

The steam from the waste-heat-boiler system passes through a jacketed pipeline to the power-house. The steam goes to the 3,000-kilowatt, 3,600-r.p.m. turbo-generator which produces 2,300-volt, 60-cycle, 3-phase current. The exhaust steam from the turbine goes direct to a condenser but some can be bled to the evaporator if desired. Live steam in excess of the turbine requirements automatically by-passes the turbine and goes into the condenser through a relief valve. If desired some of the excess live steam can also go direct to the evaporator.

The pure make-up water from the condenser and the evaporator goes through a vent condenser and a de-aërator which removes all the air. The water is then pumped back to the waste-heat boilers by two six-stage centrifugal pumps.

Other equipment in the power-house includes a 12- and 16- by 14-inch air-compressor.

The 2,300-volt current from the turbo-generator is distributed to the various plant departments through a main switchboard in the power-house. All the distribution is made through underground cables protected by lead armor and jute. The 2,300-volt current is usual for all the motors of over 50 horsepower. Each of the departments—the quarry, crusher building, kiln building, waste-heat department, raw-grinding mill, clinker mill, packhouse, shops, laboratory and power-house—has its own bank of transformers for reducing the voltage to 440 for the smaller motors.

Rotary compressor which supplies air for the blended raw-material pump.

Dust-proof reflector-type lights are used throughout the plant and all tunnels and pits are equipped with vapor-proof fixtures. Oil circuit-breakers, safety switches and other approved equipment is used throughout the plant. Motor-reducers are used to drive most of the conveyors and elevators.

All the engineering design and part of the construction were done by the company's forces. Much of the credit for the efficient operation of this plant is due to its veteran staff. G. S. La Forge, superintendent, has been at this plant since 1913 and has held his present position since 1918. C. E. Eichelberger, master mechanic, has been there nearly as long, as have also Howard Gray, plant engineer, and George Skinner, chief chemist. The youngest of the group is Roy Winters, who has been at this plant 10 years but with the company for 20 years. Most of the other employees have been at this plant over 10 years.

Safety has always been a watchword

(Continued on page 46)

The 150-horsepower Diesel engine and generator in one of the two 20-ton Diesel-electric locomotives.

By W. E. TRAUFFER

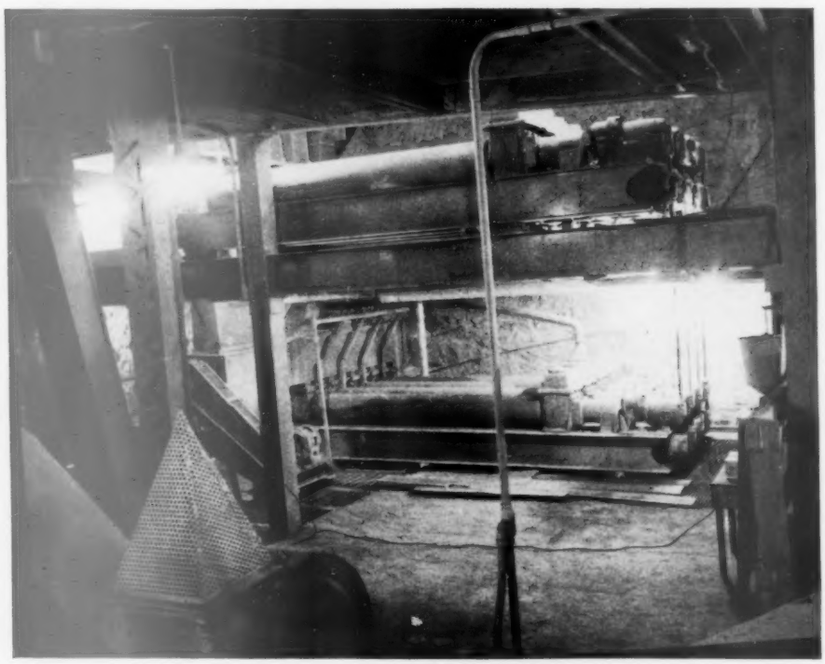
New Specifications for Cooled Cement Are Met by Use of Water-Cooled Screws

The upper battery of coolers with motor-reducer drives in foreground. Cement-feed screw in background.

ONE of the most urgent problems at present confronting a large part of the cement industry is that of delivering cool cement for various types of construction work. This problem has developed due to the requirement in some recent specifications that the cement be delivered at the job at a temperature of not over 125 degrees F., and, in order to meet this requirement, it is necessary for the producer to deliver the cement to the silos at not over 140 degrees. Handling and shipment from the silo to the job results in a further cooling of the cement sufficient to meet the specification limit of 125 degrees at the job.

Heretofore, some specifications limited the temperature of the cement at the job to 140 degrees F., and most producers were able to meet this without great difficulty. Some cooled their cement by spraying the finish-grinding mills or by water-jacketing the cement transport lines or screw-conveyors. Others did it by recirculating the cement in their storage silos or stockhouses. In most cases these measures, however, were not sufficient to meet the new specification, even when used in combination, and many producers are being forced to find a new solution to the problem.

One cement plant in the Lehigh Valley, faced with the requirement for cool cement, solved the problem by the installation of a Fuller finished-cement cooler. This is the first commercial installation of this equipment, and by its use the clinker is ground and the resulting cement is cooled and stored in silos in a continuous process. Samples of this stored material invariably have been found to meet the temperature requirements. This equipment went into operation May 10, 1941, and has been operating continuously on a 24-hour a day basis since this date.



A view showing both batteries of coolers.

Before the installation of this cooler the various cooling methods described above were used in this plant. Formerly, the initial heat at the tube-mill discharge averaged about 285 degrees F., but now, with the spraying of the mills no longer necessary, the discharge temperature averages about 300 degrees. Water jackets around the transport lines, which effect a 20- to 30-degree reduction in temperature and recirculation to meet former specification requirements, have been discontinued. These former cooling methods are costly, and with the new low-temperature limits are incapable of meeting requirements.

The clinker grinding is done in this plant by two batteries of four 5½- by 22-foot tube-mills. The cement is discharged to screw-conveyors feeding to a common bucket-elevator. A 4 by 5-foot Tyler Hum-mer screen removes any foreign matter from the cement before it is fed to two batteries of Fuller cement coolers. Each battery consists of four cooling units and the two batteries can be operated in series or in parallel.

The cement from the screen is carried to the first or upper battery of coolers by a screw conveyor and slide gates control the feed to the individual cooler units. When grinding at full or nearly full capacity, which is greater than the capacity of the upper cooling battery, there is an overflow of cement from this screw conveyor to a similar

screw which feeds the overflow to the second battery of coolers. When operating at less capacity, there is no overflow from the first screw and the cement is discharged from the first four cooler units to the second battery for double cooling. At capacities greater than the capacity of the upper unit, the overflow is mixed with that portion which travels through the unit and the

A close-up view of the upper row of coolers. Vibrating screen in background.

combined feed directed to the second unit. In this manner, the maximum cooling is obtained, and a product of uniform temperature is discharged. Another feature is the fact that the cooling units are entirely independent of each other, and any one or more can be shut down for repairs, etc., without affecting the operation of the others.

Each cooling unit comprises two barrels, with one barrel positioned vertically over the other. Each barrel is provided with an inner casing, and a water-cooled screw operates in each casing to move the cement therethrough. The cement passing through the upper barrel enters the lower barrel and moves therethrough in the opposite direction. Each cooling barrel is 10 feet long and the screw casing is 10 inches in diameter. Between the casing and barrel is an annular space of 1 inch through which part of the cooling water flows. This water, which plays only a minor rôle in the cooling, first passes through the lower section of the cooler and then flows through the upper section. As each screw is kept full of cement at all times, the film of cement between the screw flights and the screw casing forms an insulating film between the hot cement and the annular space, thus resulting in inefficient heat transfer at this point.

The cooling screw, which does most of the cooling, consists of a hollow shaft, 8 inches in diameter, which has a single flight $\frac{3}{16}$ inch thick and 1 inch deep on a 2-inch pitch. The flight is attached to the shaft by a full continuous weld of flight thickness to insure maximum heat transfer. The upper screw is driven at the rate of 221 r.p.m. and the lower screw at 234 r.p.m. The centrifugal force created by the speed of rotation keeps the coolest and densest water in contact with the surface of the shaft.

The cooled cement is discharged from the cooler units through two collecting screws to an 8-inch Type H Fuller-Kinyon Pump which causes the cement to flow through an 8-inch pipe approximately 600 feet long, and to the cement storage silos some 110 feet above the pump. Air for the pumping system is supplied by a Fuller C-250 rotary air-compressor in the same room, which delivers 1,380 c.f.m. at a pressure of 17 pounds at the compressor.

The pump which transfers cooled cement to storage.

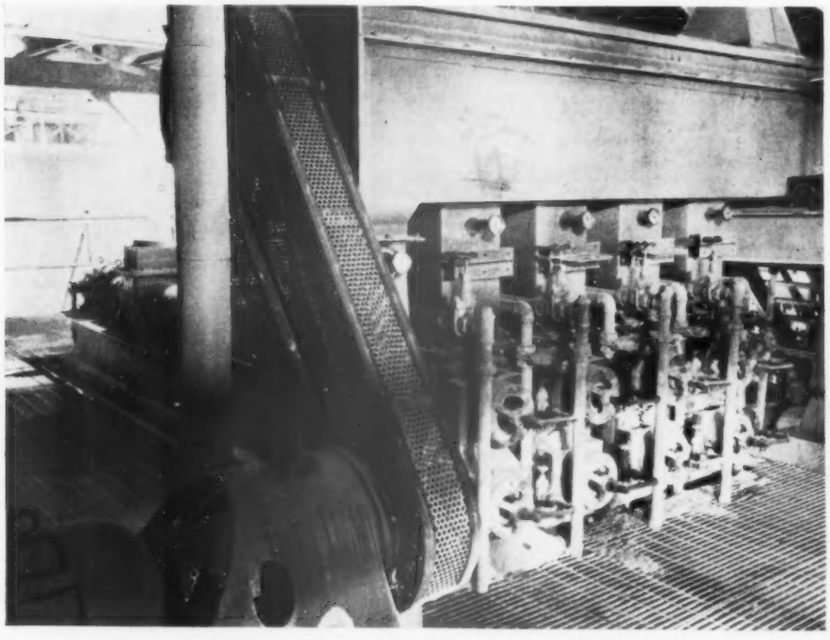
The cooling system is capable of effecting a reduction in the cement temperature from about 300 degrees at the mills to about 144 degrees in the silos, or a total reduction of 156 degrees F. This cooling is obtained with a flow to the cooler units of 400 barrels per hour, and a cement which is ground to a specific surface area of 1,600 square centimeters per gram. In fineness this cement averages 98.15 per cent. through 100 mesh, 94.1 per cent. through 200-mesh, and 84.6 per cent. through 325-mesh.

Standard Portland cement ground to 1,500 to 1,600 specific surface area is also cooled in a single pass with approximately the same results.

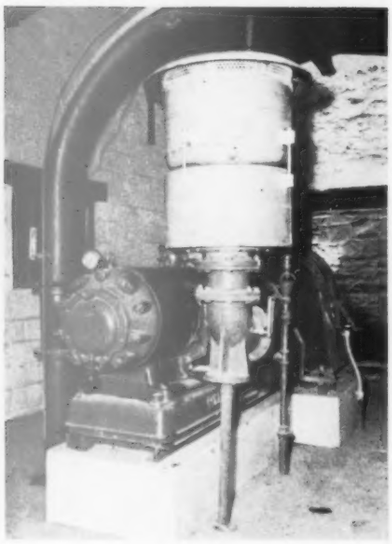
The cooler units are rated at 50 barrels per hour each by the manufacturer.

When producing modified or other high-area cements, the mill-grinding capacity is reduced, and much lower temperatures are obtained although there are no specifications requiring them. When handling cements of this type and at this capacity, it is found that the mill discharge temperature is about 279 degrees, with the temperature reduced to about 146 degrees at the discharge end of the first battery of cooler units and 113 degrees at the discharge end of the second battery of cooler units.

The cooling water being used in this



Another close-up view of the upper battery of four coolers.



Rotary compressor which supplies air for cement pump.

first commercial installation is cold spring water pumped from the quarry, and the temperature ranges from 48 to 54 degrees.

The eight cooler units use a total of 200 gallons of water per minute, and when the water-feed temperature is about 53 degrees, the water discharge temperature from the cooler jackets on single-cooling is about 70 degrees, and from the screw shafts about 117 degrees.

A separate 5-horsepower Master gearmotor drives each screw of each cooling unit, and thus each cooler is independent of the others, which has been found to be most satisfactory in every way. The actual power consumption by each cooler screw is 2.92 horsepower.

Although the coolers are themselves entirely dustless, each unit is operated under a slight vacuum to carry off water vaporization, which develops upon reduction in temperature.

These coolers have also been responsible for a considerable reduction of temperatures in several plant departments, making working conditions much more pleasant in hot weather. This is true of the conveyor tunnels and particularly the pack-house. The cooler cements also make the loaded bags much easier for the men to handle, and are much less harmful to glued bags. The coolers are noiseless and require no extra attention.

Dust-collector which is connected to the entire cement-cooling system.

Lehigh (*from page 43*)

in Lehigh plants and Union Bridge is no exception. The Portland Cement Association award for a perfect record has now been won for four consecutive years. Mr. La Forge personally supervises this work as chairman of the safety and welfare committee.

Cleanliness is usually a companion of safety and this is the case at this plant. Dust-collectors catch all but an infinitesimal part of the dust created and that portion is not given any rest. In the power-house is a portable vacuum cleaner which has a cyclone to catch the coarse dust and a bag for the fine.

The new concrete-block and stucco change-house for the employees is one of the best in the industry. It has separate sections for the white and Negro help and for the foremen, and all conceivable conveniences.

There are also complete machine and blacksmith shops and a well-equipped store-house.

Most of the new buildings were constructed entirely of concrete and steel with corrugated cement-asbestos roofing and siding.

Fertilizer Minerals Readily Available

The United States, within the next few years, could readily be independent of all foreign sources of minerals required to manufacture artificial fertilizers essential in an emergency to the domestic production of adequate supplies of food, according to a report just submitted by Dr. R. R. Sayers, director of the Bureau of Mines, to Secretary of the Interior Harold L. Ickes.

Of the three principal elements vital for plant growth and therefore indispensable for national defense, the bureau's report shows, phosphorus is now available in this country in sufficient quantities to meet all current or projected needs; potassium is expected soon to reach a level which will make the United States self-sufficient in that respect.

In many parts of the country, says the Bureau of Mines, production of food is absolutely dependent upon the use of artificial fertilizers. More than 60 million of the 360 million acres of land cropped annually require the use of fertilizer every year.

Domestic consumption of commercial fertilizers during the past 30 years, according to the report, has fluctuated between 4 million and 8 million tons annually, the average being about 6 million tons. Current consumption, however, is above the average, and in the near future America's farms are expected to demand between 7 and 9 million tons a year.

Present capacity for fertilizer production, states the report of the Bureau of Mines, is over 16 million tons, or twice as much as the consumption of any past year, and appears adequate to meet any demand likely to arise during the next few years.

Basic Refractories Made from Dolomite

Following the lead of the Canadian refractories industry in the production of excellent high-calcium magnesite refractories and taking a cue from the producers of technical magnesium carbonate in the separation of the lime and magnesia contents of dolomite, American manufacturers have started production of high-grade basic refractories from dolomite as the raw material. These developments have fortunately been timed to meet the vastly increased demand for basic refractories created by the unprecedented national-defense program now under way. Basic Refractories, Inc., has for several years been manufacturing a basic refractory from dolomite, the magnesia of which is built up by the addition of brucite and serpentine and the lime converted to the orthosilicate, which is stabilized with chrome ore.

The Standard Lime & Stone Company is also producing a refractory from the product obtained by leaching the slightly soluble calcium oxide from calcined dolomite with large volumes of water. At least two other processes for the production of high-magnesia materials for refractories from dolomite are now under investigation in the pilot-plant stage—one by treatment of the calcined and slaked dolomite with hydrogen sulphide and subsequent extraction with water, and the other by extraction of the calcined dolomite with sugar solution. Another process to which some consideration has been given is the use of the lime content of calcined dolomite for the recovery of ammonia in the ammonia-soda process for the production of sodium carbonate.

What Do We Really Know About the Various Cements?

A PERUSAL of books, pamphlets, association proceedings, and trade-journal articles shows that a great deal is written in connection with the materials entering into concrete and masonry construction.

In those publications having to do with the construction field in general one finds a considerable volume of data covering the design of concrete and masonry structures in which engineering principles are involved, including such considerations as stresses, wind pressures, foundation soils, moving loads, and the like.

One also finds considerable data having to do with the steel used in reinforced-concrete construction, its composition, strength, and the like. Further along one learns of the design of the concrete mixtures in which the aggregates, coarse and fine, the cement and the water, the time of mixing, fineness modulus, slump, and a number of other considerations are discussed.

The literature having to do with the subject in general is of a voluminous nature, not easily absorbed by the general rank and file of engineers, architects, producers and consumers.

Taking reinforced concrete as a subject, and notwithstanding the fact that steel composes the least volume of all the materials entering into it, there have probably been advanced more views and designs covering the use and part that steel plays in reinforced concrete, than for all the rest of the materials combined. Even were steel to compose 10 per cent. of the volume of a given concrete construction, one would still find twice as much in the literature having to do with the subject as is to be found concerning those materials that compose the larger volume—the aggregates, the cement and the water.

The use of steel by itself, or in connection with gravel and sand, would still require some cement in order that a sane construction would be arrived at. On the other hand cement, though expensive, could be used by itself, or with sand, coarse aggregate and steel individually, yet make possible a construction that, while not to be recommended, would nevertheless serve.

It would appear, then, that the scarcity of literature covering the subject of cements, which form the most important material entering into reinforced-concrete or masonry construction, is due to one of several reasons. Either those having to do with the production and consumption of cements know very little about the subject, or are averse to advancing their ideas and views for fear of being taken to task by scientists and theorists sitting on the side lines waiting for just such an opportunity.

At any rate there have been produced, and over a period of centuries, cementitious products of one type or other. At the present time Portland cements compose the largest percentage of cements of all kinds going into concrete and masonry construction. There are no two brands of Portland cement alike in quality, notwithstanding the fact that hundreds of brands of this product are produced in various parts of the world. The reasons for variations in quality and performance between one brand of Portland cement and another, or in the same brand from day to day, are difficult to explain in view of the wide variety of materials that go into composing the final product, and the varied treatment these materials are given.

Generally, Portland cements are made by the dry, the semi-moist, and the wet processes. They are made from marl; limestone with clay; limestone with shale; cement rock; cement rock and limestone; cement rock with shale or clay; oyster shells with clay or shale; blast-furnace slags with limestone and with shales or clays. In fact, any number of calcareous materials may be used with different types of siliceous or argillaceous materials to arrive at the raw cement mixture and, regardless of the process involved, the equipment used, and the materials treated, the end product is Portland cement.

We find Portland cements high in lime, those having medium lime contents, those that are extremely low in lime. The same is true of the amounts of silica, alumina, iron oxide, magnesium oxide, and some of the minor constituents. Some cements have high alkali contents, while others are practically void of these components. Others contain indications of manganese, titanium, sulphides. Some have high free-lime values, while others are low in this respect.

We find Portland-cement clinker being burned through the use of coal as the fuel. Others employ fuel oil or gas. The clinker may be burned in kilns having a diameter of 4 feet and a length of 40 feet, or in kilns having diameters as great as 14 feet and lengths that approach 400 feet. The cement is ground in mills ranging in size from 4 feet by 12 feet to 8 feet by 50 feet, yet the end product remains Portland cement.

Some Portland cements are ground to a fineness of 80 per cent. passing the 200-mesh sieve, while others are ground so that there remains little or no residue on the sieve. Of recent date, and apart from the use of the sieve for plant control work, surface area has come into prominence. Thus we have cements ground to a surface area of 1,500, while others have a surface area approaching 3,000.

Casual observation of Portland cements shows them to have a variety of colors, of which grey predominates, but which range through the various shades of browns, tans and chocolates.

We find cements that are of a slow-setting, though quick-hardening type. On the other hand we find cements of the quick-setting, but slow-hardening type. Some cements show extremely high strengths at the early ages of 24 hours and 3 days, and thereafter remain motionless or tend to retrogress. Other cements show fair early-day strengths and steady increases thereafter up until the 3-month age is reached. Most Portland cements show little increase in strength after the age of 6 months. A great many show retrogression in strength before or after that time.

Some cements show greater resistance to the corrosive action of alkali ground and sea waters, as well as chemical solutions, than do others. Some cements show a great deal of expansion, while others may have high shrinkage factors. A cement from one factory may be produced from the identical materials that are used in producing Portland cement at a second factory, yet one brand may have a very high heat of hardening, while the temperature rise of the second cement is negligible. A cement containing only 0.20 per cent. of free lime may be unsound in the boil test and disintegrate in the autoclave, while

By ALTON J. BLANK
Vice-President, Cementos Atoyac, S. A., Puebla, Mexico.

another cement having as much as 3.00 per cent. of free lime may prove to be sound and free of expansion in both the boil and the autoclave test. Others may shrink in the autoclave, or show signs of discoloration.

When used in concrete some cements show very good plasticity and working properties, while others work harshly. Some cements make a very dense and impermeable concrete, while others do not.

Some cements are of the staining type, others of the non-staining variety. Some of the cements may yield high tensile, yet low compressive strengths, others low tensile and high compressive strengths, while the exceptions may be low or high in strength qualities when tested for tensile and compressive strengths. Then again, the addition of several per cent. excess or deficiency in the mixing water may change the picture, as does the length of time of mixing. But notwithstanding all the wide variations that may show in one cement as compared with another, the products, through meeting a very loosely drawn-up though nicely-worded specification, are considered standard Portland cements.

Next in volume come the masonry cements, the use of which has spread during the past few years, and which are being produced by a large number of Portland-cement as well as lime manufacturers in increasing numbers. As in the case of Portland cements, the masonry cements are produced from a variety of materials, and through a number of manufacturing procedures.

There are those masonry cements that are the result of mixing Portland cement with hydrated lime; Portland cement ground with limestone of both the calcareous and dolomitic types; Portland cement ground with shales, clays, earths, sometimes in their raw state, other times in the calcined state; and Portland cement ground with slags and volcanic materials. These products contain Portland cement in a predominant quantity.

Other masonry cements contain lime mixed or ground with siliceous materials. The limes may be of the calcium, dolomitic, or of the cement-rock type, and the siliceous and argillaceous materials consist of shales, clays, earths, slags, tufas, and with small amounts of Portland cement. Products of this type usually contain a large percentage of lime with lesser proportions of siliceous or argillaceous materials, Portland cement composing the minimum ingredient.

These masonry cements, while all coming under several existing specifications, are, as in the case of Portland cements, variable in quality from one brand to the other.

Some of the masonry cements, and particularly those containing large amounts of Portland cement, yield extremely high strengths; in fact, sometimes double and triple the strength that is desired in a masonry cement. This strength is usually had at the expense of plasticity, fatness, adhesion, permeability, sand-carrying capacity, and other properties more desirable in the product.

Other masonry cements, and usually those containing the larger proportion of lime, provide fair strength and a majority of the other properties desired.

Those consisting mainly of natural or hydraulic cement, while plastic, usually develop little strength.

A number of the products are unsound as determined by the boil and autoclave tests, and show great expansion, while others have decided shrinkage factors.

Some of the masonry cements are of the non-staining variety, while others are not. Some take their initial set within a couple of hours, while others require half a day, and some attain their final set in 4 hours while others arrive at it in 2 days. In general, and as in the case of Portland cements, no two products are alike, yet all may pass the specifications governing them.

The earliest cements produced were those of the natural and hydraulic types, while years ago those were used in general concrete construction they have in late years been relegated to the field of masonry cements. In some special cases these natural cements are used in connection with Portland cements.

These cements are the result of calcining natural cement rock, resulting in a more or less plastic product which develops feeble strength properties. Others are the result of a mixture composed of slag with lime, and the like. As in the case of the cements before mentioned, these products also are variable from one brand to the other.

Last in volume are the special types of cements in which Portland cement constitutes the major material, while slags, limes, calcined shales, clays, earths, sands, etc., are the minor constituents. These cements, due to the fact that until recently no specification existed for them, did not constitute a large volume until recently when their advantages for specific types of constructions were recognized.

They vary in quality as do the other types of cements mentioned, since a wide variety of materials and methods of processing are followed in their manufacture. They possess, however, many desirable properties and qualities not prominent in the majority of Portland cements with which they compete. Summed up, they as a rule are very workable, show no retrogression in later-day strengths, and usually pass the autoclave test for soundness.

This brings us to the various types of lime that are produced for use in mortar, plaster, and the like. High-calcium limes are produced in the greater number, and though they may be very similar in calcium composition, a considerable difference may be found in their plasticity, adhesion, waterproof properties, strength, etc.

The same holds true for the lower-calcium limes, while the dolomitic limes are a distinctly different kind.

None of the limes, when used in mortar or plaster, ever attain much strength, excepting at such points where they are exposed to the air, and in the masonry-construction field a large portion of the total volume utilized is for use as an admixture with Portland or other cements.

This brings us back to the starting point in which it was mentioned that cement producers and consumers either know little about the subject, or do not care to wander out on delicate ground in the advancement of their views and theories as to why, in the case of a given product such as Portland cement, one brand may act so differently from another.

It is possible that a number of the following questions have been asked before now but, on the other hand, it remains very probable that none of them have been answered to the entire satisfaction of all the persons interested in the manufacture or use of the cements in question.

1. What makes cement set up and harden upon being mixed with water?
2. What causes the cement to set up initially? Finally?
3. Why do cements have only two sets, namely initial and final? Why should they not have three or five different setting times?
4. Why do some cements have high initial strengths?
5. Why do some cements have low initial strengths?
6. What causes cement to increase in strength over a period of time.
7. What causes some cements to retrogress in strength after a certain age has been reached?
8. Why do some cements of the Portland type, having initial insoluble-residue contents of several tenths of one per cent., have their insoluble-residue contents increased to several per cent. after a period of several years?
9. With a given Portland cement, gaged with the corresponding amount of water as determined by the normal consistency test and developing a certain temperature rise during hardening, why does increasing or decreasing the amount of mixing water result in wide

variations from the normal temperature rise?

10. In recent years considerable attention has been paid to the compound composition of Portland cement, and less attention to its chemical analyses. Taking the view that the compound composition of a Portland cement is a certain percentage of calcium silicates, aluminates, ferrites, etc., what is the composition of the cement after it has been gaged with water and has hardened?

11. What gives plasticity to some cements and not to others?

12. What causes shrinkage in some cements and expansion in others?

13. Is a given raw cement mixture, when fused to clinker by the dry, the semi-moist, and the wet process, productive of three cements that are identical as to quality, compound composition, etc.? If not, why?

14. What test now in use definitely determines whether or not a cement is sound?

15. Why should a cement that passes the boiling test, and the autoclave test, be considered as being sound, when the neat test pieces show signs of disintegration after storage in air and in water after a period of months?

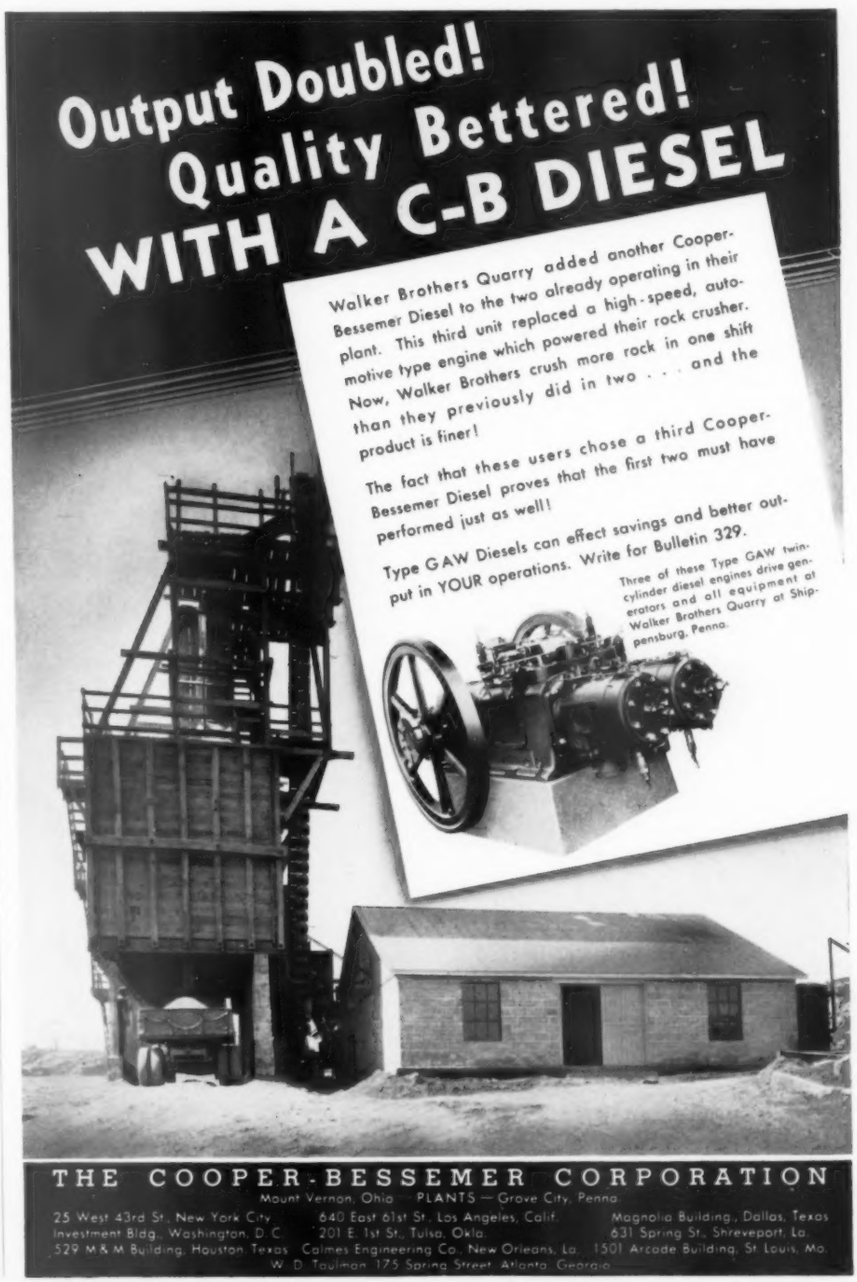
16. Why do some cements having low tensile-strength values show high compressive-strength values, and *vice versa*?

Magnesite Production Reaches Record Level

The domestic magnesite industry, created largely by World War I, attained a record production in 1940, according to the Bureau of Mines. The output exceeded the peak war year of 1917 when the then infant industry was called upon with but little notice to supply virtually the entire magnesite refractory needs of American industry. Crude magnesite produced by domestic mines, including the ore equivalent of synthetic magnesite from sea-water bitterns, in 1940 amounted to 333,166 short tons—an increase of 3½ per cent. over 1917 peak production and more than 76 per cent. in excess of the tonnage produced in 1929. California, Washington, Nevada, and Texas were the producing states. Dead-burned magnesite domestically produced in 1940 amounted to 140,668 tons. This amount was 10,171 tons in excess of the total available supply in 1939 from both imports and domestic production, and almost 1,500 tons greater than the available supply in 1937. In 1940 the production of caustic calcined magnesite, likewise, surpassed previous records at slightly more than 16,000 tons.

In the years 1914-1918 the American magnesite industry was totally unorganized, reserves were a matter of guesswork, shipments often had to be made by primitive methods from mines to railheads, calcining furnaces being lacking at the mines 2 or 3 tons of crude material had to be shipped hundreds of miles to obtain but one ton of burned material, and personnel was untrained. To-day operations are well organized, and the industry is on a stable basis and ready to produce the necessary quantities of material for national defense.

Magnesite is being utilized in some European countries as a source of magnesium for the light magnesium alloys for airplanes, bomb shells, and other important war-time uses. Domestic magnesite likewise is scheduled in 1941 as raw material for magnesium, which hitherto has been produced in the United States almost exclusively from brines. The chief use of magnesite is in magnesite refractory materials for lining iron and steel and nonferrous-metal smelting furnaces, lime and cement kilns, and electric furnaces. Floors made of magnesite cement, the chief outlet for caustic calcined magnesite, do not crack when subjected to vibration, and magnesite lumber is fireproof. About 2,000 tons of magnesite is used each year in the production of magnesium chemicals.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The Hydration of Magnesia in Dolomitic Limes

By THERON C. TAYLER

DOLOMITIC limestone of 60-per cent. $CaCO_3$ and 40-per cent. $MgCO_3$ when burned becomes quicklime of 64-per cent. CaO and 36-per cent. MgO. When water is added, the CaO readily combines to form $Ca(OH)_2$. Under ordinary hydrating conditions little or none of the MgO combines with water but it can be made to partly or fully combine to form $Mg(OH)_2$.

Thus, by ordinary hydrating methods the manufacturer of dolomitic hydrate gets only 120.6 pounds of hydrate from 100 pounds of quicklime, whereas it is possible for him to get 136.8 pounds. Failure to hydrate the magnesia has cost him the sale of 16.2 pounds of water at hydrate prices. He is wasting $\frac{16.2}{136.8}$, or 11.8 per cent., of his output. By hydration of the magnesia he can increase his sales by $\frac{16.2}{120.6}$, or 13.4 per cent.

Complete hydration of the magnesia will increase the market for dolomitic hydrate. Dolomitic lime fully hydrated makes just as good sand-lime brick as the high-calcium lime now generally used and there are reasons to expect even better results.

There is a growing trend toward the use of high-pressure steam for curing concrete products and along with this trend is an increasing use of lime in such products.

A sand-lime brick made with dolomitic lime containing unhydrated magnesia may increase in volume during hardening as much as 50 per cent. and will be worthless. It is important that manufacturers of high-pressure steam-cured concrete units, like manufacturers of sand-lime bricks and blocks, tolerate very little free MgO in their lime supply.

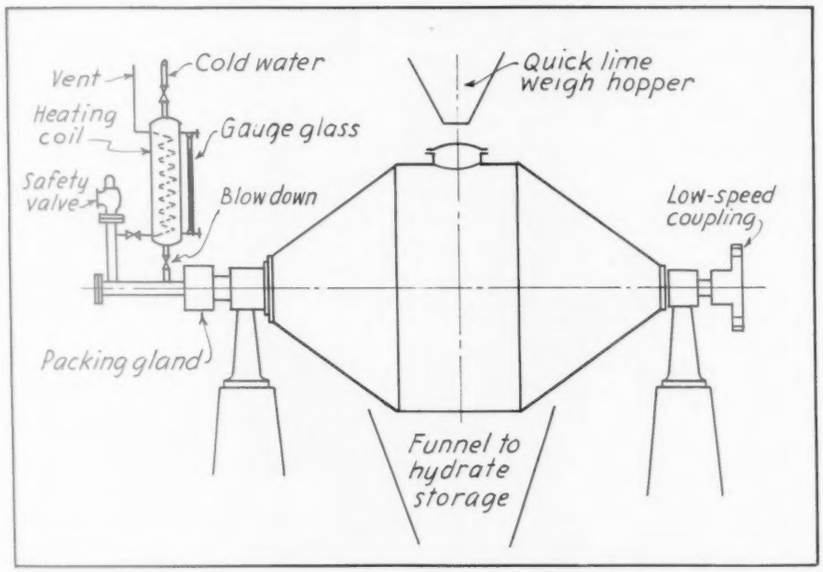
Dolomitic lime has been successfully used for plastering for centuries and there seems little reason for manufacturers to become much disturbed over new soundness standards.

Reports of the U. S. Bureau of Standards indicate that complete hydration of the magnesia increases the plasticity of the resultant mortar and plaster. A dolomitic lime not desirable for plastering may become a preferred product, if fully hydrated.

The increased plasticity, broadened sales field, and increased output per ton of quicklime seem ample reasons to justify immediate development in this field. Up to date little has been accomplished commercially by lime producers.

For several decades the sand-lime-brick industry has fully hydrated magnesia. The accompanying sketch shows a form of hydrator in general use in European sand-lime-brick plants and used successfully to hydrate the magnesia in dolomitic lime. The machine consists of a steel drum built for 100 pounds steam pressure and mounted in trunnion bearings to be revolved slowly to facilitate complete mixing of the contents. A measured batch, usually several tons, is fed into the machine. It is set in motion and a measured quantity of water is added through the trunnion. Hot or cold water or even steam may be supplied. Any excess of pressure generated is released through a safety valve. Blow-down steam may be used as indicated to preheat the water supply. The time required for complete hydration may vary from about 15 minutes to 90 minutes per batch depending on several factors, such as the steam pressure maintained, the temperature of the water supplied, the degree to which the lime has been burned, and the analysis of the lime.

It is doubtful if any plan which does not involve pressure hydration will prove sufficient to make a product suitable for some chemical purposes and for sand-lime or concrete brick and block manufacture.



Sketch showing hydrator for magnesia in dolomitic lime.

Theoretical Combining Proportions

56 parts CaO + 18 parts H_2O = 74 parts $Ca(OH)_2$
40 parts MgO + 18 parts H_2O = 58 parts $Mg(OH)_2$

Ordinary Hydration of 100 Pounds of Dolomitic Quicklime

64 pounds CaO	+ 20.6 pounds	H_2O =	84.6 pounds	$Ca(OH)_2$
36 pounds MgO	+ 0	H_2O =	36. pounds	MgO
100 pounds quicklime	+ 20.6 pounds	H_2O =	120.6 pounds	ordinary hydrate

Complete Hydration of 100 Pounds of Dolomitic Quicklime

64 pounds CaO	+ 20.6 pounds	H_2O =	84.6 pounds	$Ca(OH)_2$
36 pounds MgO	+ 16.2 pounds	H_2O =	52.2 pounds	$Mg(OH)_2$
100 pounds quicklime	+ 36.8 pounds	H_2O =	136.8 pounds	hydrate

Coplay Joins Ranks of Cement Plants Which Employ Direct-Firing Systems

Extension on trestle over the coal-storage pile at the Coplay plant. Coal hopper at right.

As part of a long-range program of plant improvements begun several years ago the Coplay Cement Manufacturing Company, Coplay, Pennsylvania, recently completed the installation of a new coal storage, handling and grinding system. This is another case where an old coal-grinding department and bin-feed system have been replaced by a direct-firing system, but it is of more than passing interest because a new type of direct-firing mill is used and much of the other equipment is both new and original.

The old coal department had been used since this plant was built in 1898 with only a few minor replacements of the original equipment. Coal was discharged from cars on a trestle to a stock-pile. A crusher was used for other than slack coal. Other equipment included two indirect-heat rotary driers and three old-style grinding mills. All the handling and feeding of the coal was done by screw-conveyors. The decision to abandon this department was made chiefly because of the age and obsolescence of the equipment with consequent high repair and operating costs. The new system also removed a serious fire hazard which had caused several explosions, and eliminated a dust nuisance. The type of direct-firing coal mill installed is a flash pulverizer which does not create an explosive mixture until the coal enters the kiln-feed pipe. Nothing of the old system was retained except part of an outdoor stock-piling arrangement.

The new system is entirely automatic and has a capacity of 40 tons per hour. As this is far in excess of the actual coal consumption, the system operates less than half of the time. The old coal department had to be operated continuously, running empty when all the bins were full. There has been no change in the fineness of grinding which is about 82 per cent. through 200-mesh. A substantial saving is being made in the cost of coal handling, repairs, power, etc.

The new Whiting direct-firing mills and the new coal-handling handling system have materially cut the former total coal consumption of the four kilns with an accompanying increase in production. This improvement is all the more remarkable because of the already high efficiency of the kilns. Some years ago Grudex preheaters were installed on the 125-foot No. 1 and 2 dry-process kilns and these reduced the coal consumption per barrel 35 to 40 per cent. Obviously any additional improvements over such figures would put these kilns in a class by themselves.

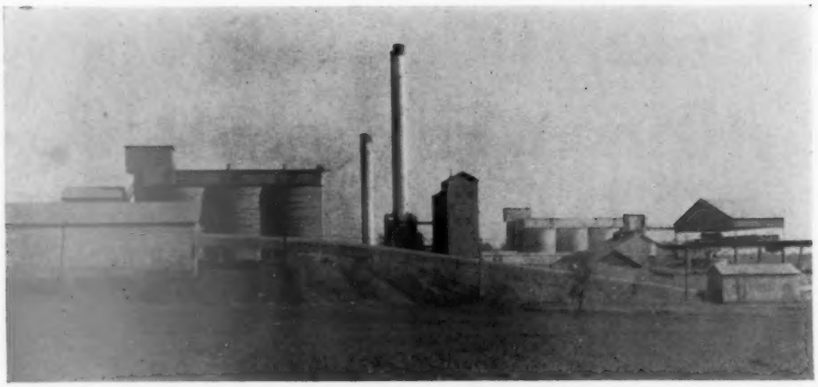
The use of these mills also makes possible automatic control of the air temperature and the volume of primary air. The high speed at which this type of mill operates and the high velocity of the air leaving it greatly reduce the lapse of time between the entry of the coal into the mill and its subsequent entry into the kiln. This means that there is only a very slight lag in the automatic adjustment of the rate of coal feed to variations in the burning temperature in the kiln. Pulsations of the flame are reduced with accompanying even and efficient burning. This has also resulted in appreciable savings in the finish-grinding department. A Brown Instrument Company visual

Direct-firing coal pulverizer serving one of the kilns.

control device aimed at the kiln wall in the burning zone automatically controls the rate of feed of coal to the mill.

The old trestle used for stone and gypsum was extended for coal storage and a concrete hopper was built at

The "eye" of the visual-control device which regulates rate of coal feed to kiln.



A general view of the Coplay plant.

the near end of the 3,000-ton-capacity coal stock-pile. Ordinarily 4 car-loads of coal are unloaded direct to this hopper daily. The coal is reclaimed from the dead storage to the hopper as needed by a pair of screw-conveyors. A pivoted Merrick Weightometer feeds coal from the hopper continuously into a Jeffrey hammer-mill. This mill is operated only when large coal is used, otherwise it is stationary and the coal runs through it into the Fuller Airveyor pneumatic-conveying system. This system has a Roots-Connersville constant-pressure blower and is connected

Electrically-operated automatic valve which feeds through either of the two lines.

by 10-inch pipe-lines to the four coal-mill feed bins.

Where the main pipe-line emerges from its concrete tunnel at ground level it is split into two 10-inch branch lines, one serving kilns No. 1 and 2 and the other kilns No. 3 and 4. The switch from one line to the other is made by a new type of Fuller electrically-operated automatic valve.

This valve consists essentially of a section of pipe hinged at its incoming end to the main pipe from the Airveyor by a flexible rubber-hose section. On the other end of the hinged-pipe section is a metal ring or flange with a retractable rubber diaphragm connecting it to the pipe. On the ring is a rubber seal which presses tightly against the flange of either of the two off-bearing pipe-lines. In changing from one pipe to the other a push-button starts an electric motor which drives a crank through a worm gear. This crank pulls on a lever which in turn pulls back the retractable flange, raises or lowers the pipe as the case may be, and releases the flange against the other pipe flange.

Fuller valves of similar design are used over the feed bins of kilns No. 1, 2 and 3. The valve over bin No. 3 controls the feed into it or into bin No. 4 from one of the two pipe-lines. On the other pipe-line a valve over bin No. 1 feeds the coal either into that bin or to the valve over bin No. 2. This valve in turn feeds the coal into that bin or to a valve over a bin for the stone drier.

These four valves are identical in design. Each consists essentially of a section of pipe which is hinged at the top of the flanges at its discharge end in such a way that when in place this end is closed by rubber seals. At the other end of the section is a rubber-seated flange and diaphragm and this is retracted and the pipe raised and lowered by a motor-and-crank-operated lever mechanism. When the pipe section is raised a deflector plate springs into its place and diverts the coal into the bin. Lowering the pipe also lowers the deflector. Limit stops control the lever movements and a compression spring

Weighing device and recorder for coal.

on the rod connecting the crank and the lever allows for any maladjustment or wear in the mechanism. Each pair of bins is connected to a 6-foot Fuller cyclone from which the collected dust goes to one of the mill-feed hoppers. As each of these valve mechanisms is inclosed in a dust-proof housing the installation is practically dustless.

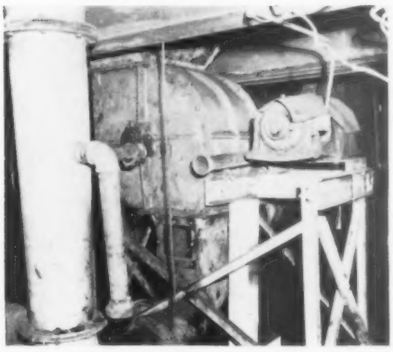
Each of the four 60-ton mill-feed bins has a lower-level Bin-Dicator and an upper-level Fuller bin-level indicator. These indicators automatically control the entire coal department through a

Coal hopper and the coal-storage at right.

special Fuller control board. On this board, which is similar to those used with Fuller-Kinyon blending systems, are push-button switches and automatic switches for every motor in this circuit and a chart with signal lights which indicate the flow of coal at all times.

This system fills a bin to its capacity and then automatically switches the coal feed to any other bin which may have gone below the Bin-Dicator level in the meantime. If no coal is required in any of the other bins the entire system is automatically shut off and does not start again until another bin has been nearly emptied. There is enough leeway above and below the indicators and the system is so timed that no bin can ever become empty. Automatic signals in the control room and on the burner floors warn of any breakdown. Connected to the Merrick Weightometer is a recorder which registers the amount of coal going to each of the four mill-feed bins and the total fed to them all.

The No. 1, 2 and 3 kilns are 9 feet in diameter and 125 feet long. These are served by No. 40 Whiting mills rated at 5,000 pounds per hour each. The 7½- by 125-foot No. 4 kiln has a No.



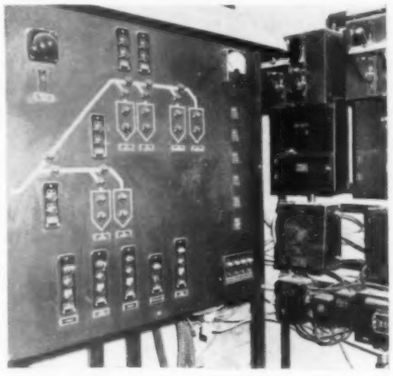
Part of the pneumatic coal-conveying system.

30 Whiting mill rated at 3,000 pounds of coal per hour. No valves or gates are needed to feed coal from the bins into the open hoppers of these machines, as it flows in by gravity at the same rate at which it is withdrawn. Syntron vibrators on the cone-shaped bottoms of these bins keep the coal from sticking. Coal is fed from the hoppers into the mills by rotary feeders which are integral parts of the mill and which operate at a rate of speed in direct proportion to that of the mill.

No figures are available on the power savings over the old system but some idea may be gathered from the sizes of the motors now used in this department. The conveyor-type feeder is driven by a 5-horsepower motor, the pneumatic conveyor by a 3-horsepower motor and the blower by a 75-horsepower motor. The two screw-conveyors have 20-horsepower motors and the hammer-mill one of 50 horsepower. The three large coal mills have 75-horsepower motors and the smaller one a 50-horsepower motor.

The Coplay company, the oldest Portland-cement manufacturer in the United States, is celebrating its 75th anniversary this year.

David O. Saylor, who founded the company and whose name is incorporated in its brands, was the first to manufacture Portland cement in the United



Automatic controls governing coal system.

States. In 1866 the Coplay Cement Company was incorporated with David O. Saylor as its president. In 1871 he was granted a United States patent covering his process for making Portland cement. In 1876 at the Centennial Exposition held in Philadelphia the Coplay company exhibited Saylor's Portland cement in competition with well-known European brands and was granted the award for superior quality.

The Coplay Cement Company and, since 1901, the Coplay Cement Manufacturing Company, have not only been pioneers in the early stages of the development of the industry in the United States, but with their successive mills, A, B, and C, have kept abreast of improvements in the art of manufacturing and in the quality of their products. The company has frequently led the industry in the introduction of new grinding, burning and conveying equipment. To mention just a few high points in this development, in 1925 the company installed the most comprehensive dry-blending system to be found anywhere up to that time. This put the quality control of a dry-process plant on a par with that of wet-process plants. In 1926 some of the first long compartment tube-mills were installed in the cement-grinding department.

In 1932 the first Grudex pre-heating unit developed by the technical staff of the company was installed.

In 1938 Diesel trucks and 2,100 feet of belt-conveyors were substituted for the railroad and hoisting equipment conveying stone from the quarry to the mill.

In 1940 direct-firing coal mills and a pneumatic conveying system were substituted for the conventional coal-preparation department.

In 1941 two-stage closed-circuit grinding combined with drying took the place of separate drying and grinding machinery.

New products were developed and marketed during the last 12 years in rapid succession:

In 1928 Saylor's Dark. This was the first dark-grey Portland cement produced in the Lehigh Valley section.

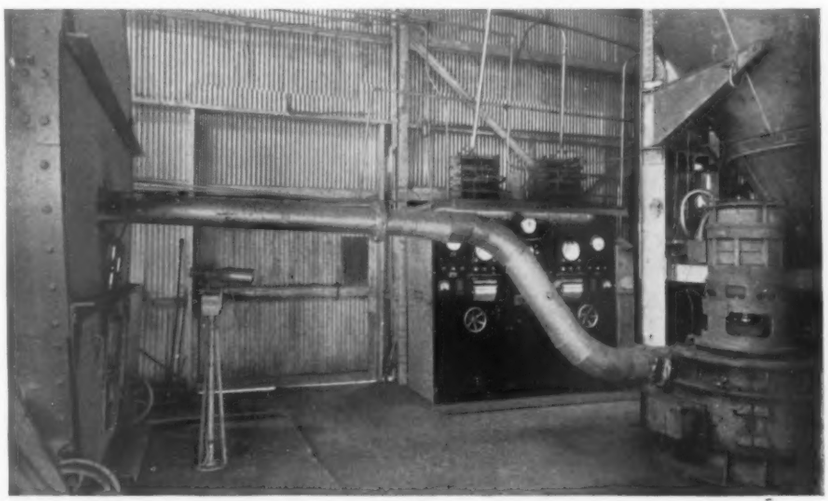
In 1929 Saylor's Waterproofed Portland containing R. I. W. Toxement.

In 1932 Saylor's Hyper, a high-early-strength Portland cement.

In 1933 Saylor's Velvet mortar cement.

In 1933 Saylor's colored Portland and mortar cements.

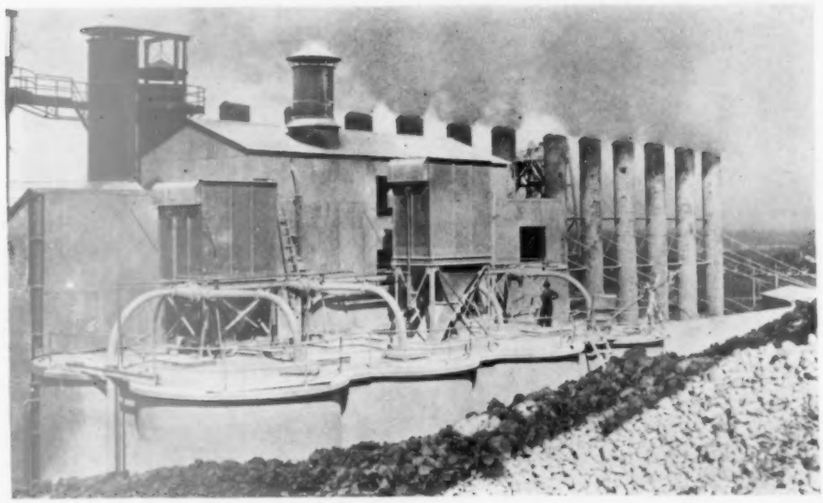
In 1940 Saylor's Dark Velvet mortar cement.



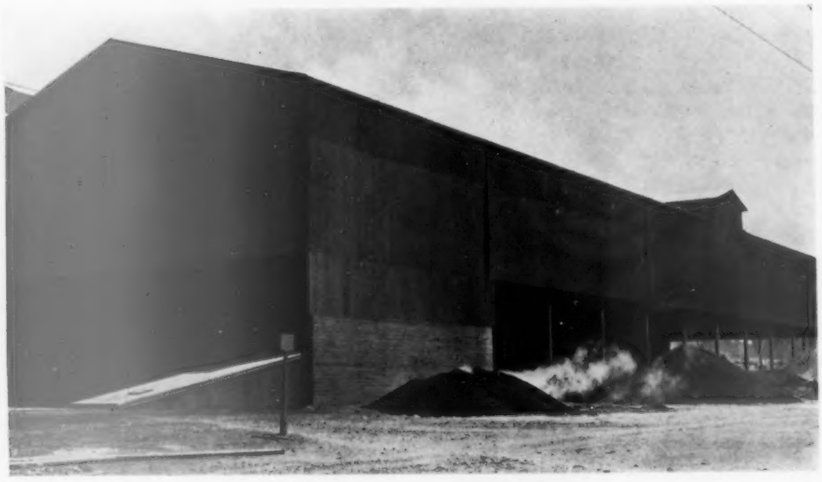
View showing the piping between kiln and coal mill, electric-eye control and the operating board.

Modernization of 35-Year-Old Santa Cruz Cement Plant Nears Completion

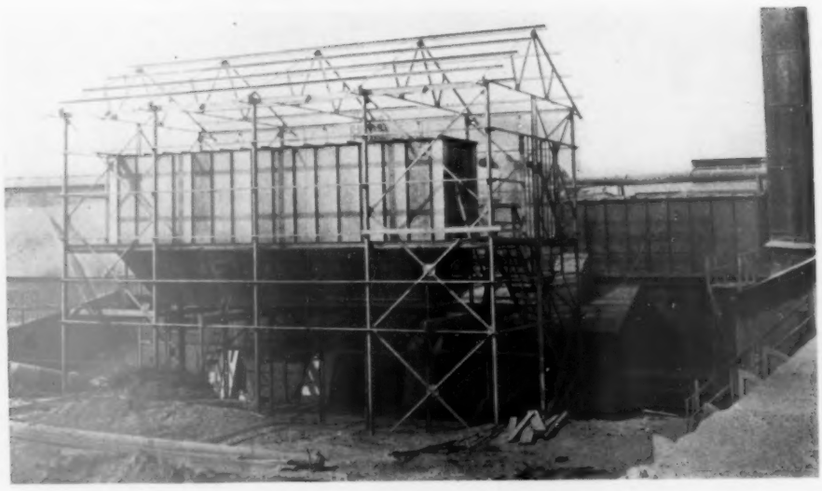
By ROBERT A. KINZIE, Jr.
Superintendent



The dust-collector installation on the new raw silos.



A view of the clinker-storage building.



Dust-collectors being installed on the drier-stacks.

THE plant of the Santa Cruz Portland Cement Company at Davenport, California, was built in 1906. As the industry advanced the original installation would have become obsolete unless there had been a well laid-out plan for modernization. The poor years of the early thirties saw the start of the present improvements which are now well on their way to completion. The only major part of the plan yet incomplete is the modernization of the rock storage.

Most of these changes, as well as a description of the plant, have been published; these include the installation of Hardinge mills in both the raw and finish mill, the installation of air-separators in closed circuit with the tube-mills in the finish mill, and the development and introduction of Santa Cruz High Silica cement, a Portland-pozzuolanic which has earned its good reputation.

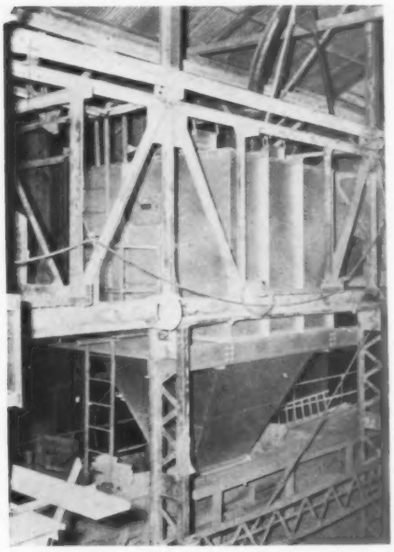
The distribution of the plant's cement was widened by the use of bulk shipment by boat from Davenport to packing plants at Los Angeles, Alameda and Stockton in California, and Portland, Oregon. This unit includes four silos, a compressor plant and a wharf at Davenport.

The more recent improvements described here were made to bring the raw mill, kiln room and finish mill more into balance; decrease the fuel consumption of the kiln room; and, by the installation of dust-collectors, to recover dust and clean up the mill. Along with these changes the electrical circuits in the mill have been modernized and the laboratory rearranged to facilitate the increased load of control work.

In 1940 the existing raw-grinding units (3 Hardinge mills) were augmented by one new Hardinge mill; it is a 10-foot by 66-foot machine mill with a No. 126 Hardinge Superfine classifier. The mill is driven by a 400-horsepower, 80-per cent. power factor, high-torque Westinghouse motor, through a Falk Steelflex coupling. The fan is driven by a 125-horsepower wound-rotor Westinghouse motor, through a 9-strand V-belt. This mill takes a 7-mesh screened roll product and grinds it to a fineness of 80 to 91 per cent. minus 200-mesh, the fineness

depending on the type of cement. A Northern Blower dust-collector takes the excess air from the circuit, returning the collected dust to the mill product. The feed to the mill is fed over a Hardinge constant-weight feeder.

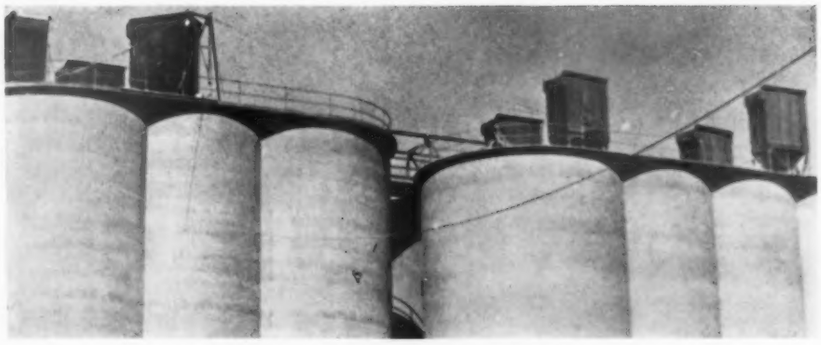
The main improvement in the kiln room is the as-yet-incomplete installation of two Lepol kilns. The operation of this type of kiln has been described in PIT AND QUARRY. The new kilns are 111 feet 8¾ inches long with a diameter of 10 feet 11⅝ inches and a shell thickness of 1¼ inches. The length of the cylindrical portion of each kiln is 105 feet 7¾ inches. They are of all-welded construction, built and installed by the Consolidated Steel Company. The travel gate is 47 feet by 12 feet. The kiln already installed discharges into a Fuller cooler.



Collector installed over kiln screw-conveyor.

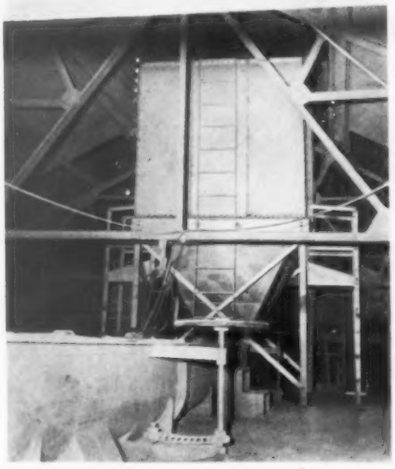
Since the new kilns were designed to operate independently of the old kilns, new raw-storage and conveying systems were installed.

The storage consists of 8 new concrete silos 50 feet by 15 feet inside diameter (over-all height 60 feet), holding 335 tons of raw material in each silo. The bottoms are steel cones. Aërating pads were installed to facilitate removal of the material. At the same time the old 8-unit raw-material storage bins were equipped with aërating pads.



Cement-storage silos showing dust-collectors.

The output from the raw mill is delivered to the old storage and the new silos by 10-inch Fuller-Kinyon pumps. The raw material is taken from both storage installations through aërating-pad conveyors. The feed to the kilns and the dust from the traveling grate are handled by 7-inch Fuller-Kinyon pumps. The outlets of the Fuller-Kinyon pipe-lines are equipped with Norblo dust-collectors. All the compressed air for the unit is supplied by Fuller rotary compressors, as follows:



Dust-collector over old raw-storage bins.

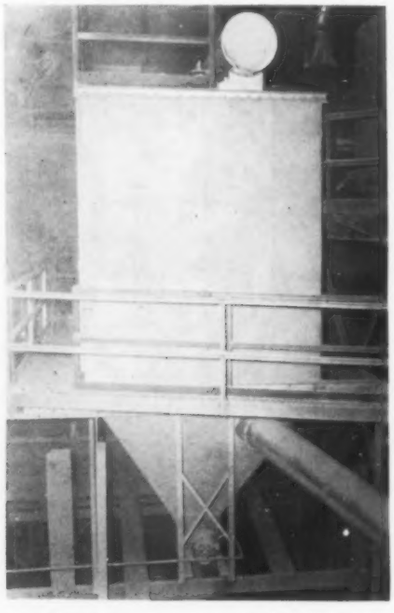
- 2 C-150 compressors — air for the 10-inch pumps
- 2 C-70 compressors — air for the 7-inch pumps
- 1 C-24 compressor — air for the aërating pads in the raw storage
- 1 C-70 compressor — air for the dust-collectors

The air entering the compressor room will be cleaned by a Norblo dust-collector.

All the motors in the Lepol-kiln installation are handled through three switchboards supplied by Westinghouse. It is completely wired for interlocking and plug-in testing.

Provision has been made for securing temperature and draft readings at numerous places in the kiln. The temperatures and the traveling-grate speed are recorded by Leeds-Northrup Micromax instruments. The draft is indicated by Bailey Meter Company equip-

Weighing building with truck scale at left and railroad-car scale at right.

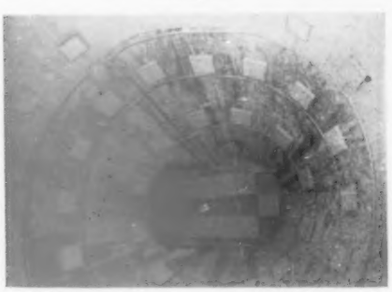


Dust-collector on raw-grinding mill.

ment. The control panel containing these instruments and the push-button station for controlling the kiln, etc., were built by Westinghouse. The Fuller clinker cooler is equipped with a Leeds-Northrup draft controller. It is probable that this instrument will later be moved to a different location, but this is uncertain until the first kiln is in operation.

This kiln was designed and installed

Outlet of Number 2 raw silo aërating-pad conveyor.



Aërating pads in old raw-material storage bins.

by the R. W. Ryder Engineering Company, except for the equipment specifically mentioned.

The old kilns were not equipped with coolers and their hot product was stored in the open. The product of the Fuller coolers can be handled on belts. The coolness of the clinker and the restrictions of some of the newer cement specifications made necessary a covered storage. This building is 350 feet long, 83 feet wide and 50 feet high to the truss. It was designed to store 120,000 barrels of clinker. The detailed design and the installation were by the Moore Dry Dock Company. The belt-conveyors were secured from Stephens-Adamson and the belts from Goodrich.

The clinker is reclaimed through tunnels under the storage space.

The capacity of the finish mill is adequate; it consists of:

1 unit—6 Gates ball-mills,
6 Gates tube-mills in closed circuit with an air-separator.
1 unit—4 Gates ball-mills,
4 Gates tube-mills in closed circuit with an air-separator.
2 Hardinge mills.
1 unit—6 Gates tube-mills for regrinding special cements.

With the increase of business in recent years, due in large part to the bulk distribution of cement by boat, more storage space was needed. The original unit of 4 silos for boat storage was increased by the addition of another 6-silo unit. These silos are 100 feet by 32 feet (over-all height 118 feet) and hold 20,000 barrels of cement each. The three intersectional bins hold 5,400 barrels of cement each. The silo shells were poured in ten days. The Dinwiddie Construction Company built all the silos at the plant.

The cement is pumped from the silos to the boat by 10-inch Fuller-Kinyon pumps. The maximum pumping distance is 3,003 feet to the forward bin on the boat and 2,997 feet to the aft bin. Cement is reclaimed from the silos by an 8-inch Fuller-Kinyon pump for use in bulk shipments as well as for package shipments in the old storage.

The last few years have seen a large increase in the bulk shipment of cement, both by cars and trucks. To take care of this demand two 60-foot Fairbanks-Morse truck and track scales have been installed.

The bulk loading can be handled by the 8-inch Fuller-Kinyon pump under the silos, or by an 8-inch Fuller-Kinyon pump in the old storage building.

This constitutes a description of the major units in the plant. Several smaller units have been installed to handle the minor ingredients necessary in the manufacture of cement to meet the present specifications.

A detailed description of the dust-collector equipment is unnecessary. All the new units have been manufactured by the Northern Blower Company. They have been very satisfactory since they are the only collectors we have used that will handle dust-laden air of high moisture content without plugging the cloths.

The list of Norblo dust-collectors and their installation follows:

Cement Silos—4 Units No. 80 installed November, 1939.
3 Units No. 80 installed July, 1940.
Raw Silos—3 Units No. 80 installed December, 1940.
Raw Bins—1 Unit No. 80 installed December, 1940.
Kiln Screw—1 Unit No. 80 installed December, 1940.
Raw Compressor Room—1 Unit No. 80 ordered (to be installed).
Raw Hardinge Mills—1 Unit No. 240 installed July, 1940.
3 Units No. 240 installed November, 1940.
Rock-Storage Bins—1 Unit No. 480 installed April, 1941.
Rock Driers—2 Units No. 640 (installation under way).

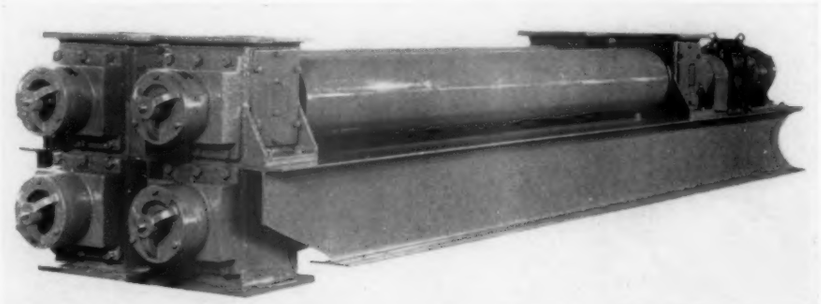
• Cement Cooler

The Fuller Company has brought out a cooler for Portland cement and other pulverized materials, especially intended for cooling freshly-ground cement to satisfactory shipping temperatures. Temperature drops ranging between 100 degrees and 150 degrees F., depending upon the initial cement temperature, are reported from coolers in commercial service.

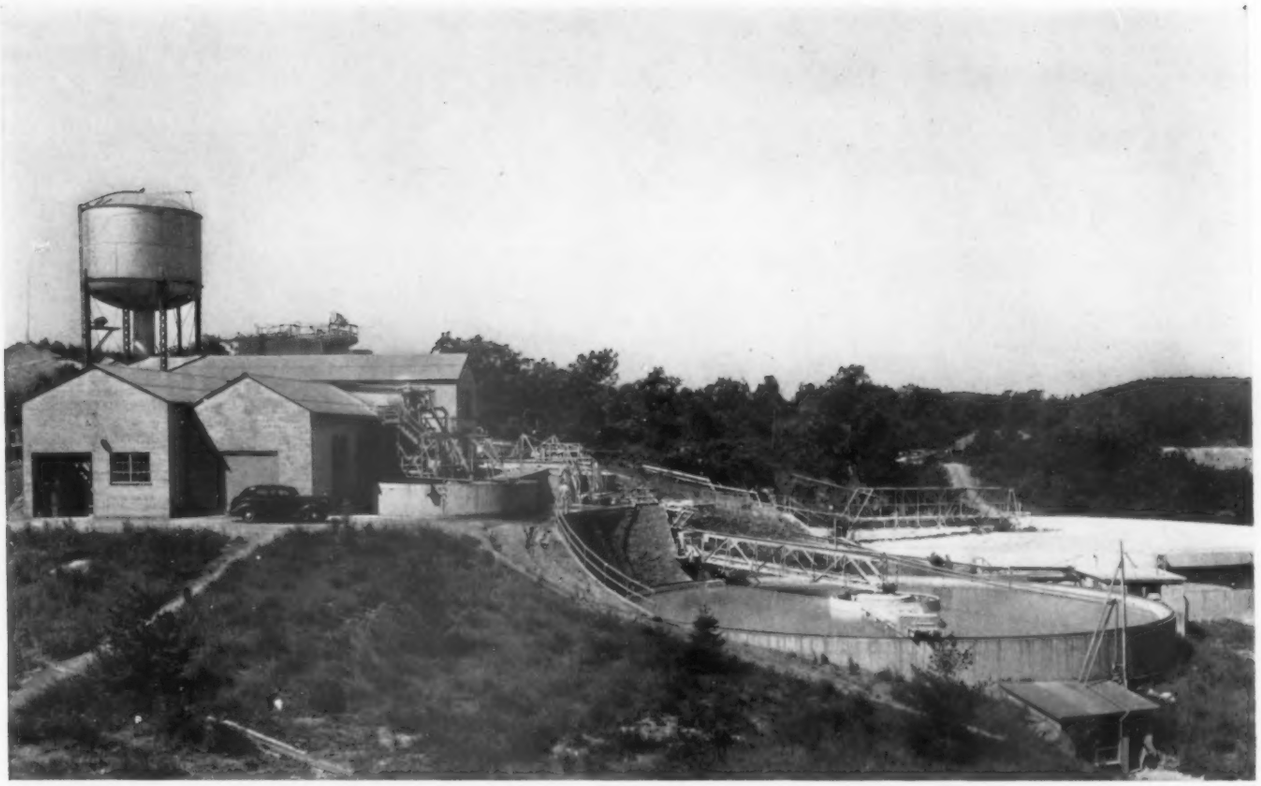
These coolers are furnished as assemblies of parallel units to meet individual capacity requirements. Each unit has a capacity of 50 barrels an hour. The cooling-water requirement at normal temperature averages 2,800 gallons per 100 barrels. The power consumed in driving the coolers is between 8 and 9 horsepower per 100 barrels.

Low vertical height is a feature of the design, adapting the cooler for installation between mill spouts and pump hoppers or collector screws and other locations when head room is limited.

Each unit comprises a pair of water-jacketed casings, each casing surrounding a cooling tube of large diameter through which the cooling water also circulates. The space between the tube and jacket is narrow to expose the cement to a large area of cooling surfaces. The hot cement enters the cooler through a flanged inlet casting and is advanced through the upper casing by narrow screw flights on the cooling tube from which it is discharged to the lower casing through a connecting casting, the cement returning through the lower casing and being discharged directly below the inlet. Each cooling tube is directly driven by a separate motor with a built-in speed-reducer. The internal mechanism is readily accessible. The cooler units are assembled in parallel with their inlet and discharge flanges at the same level for capacities above 50 barrels an hour.



Two-unit cooler for lowering temperature of freshly-ground cement.



The raw-material preparation plant at Valley Forge. The recovered products flow into the 125-foot thickener at the right from which they are pumped to the kiln storage and blending tanks. The rejected products are settled in the 80-foot thickener in the foreground, from which they are pumped to the drying plant and ultimately sold as a by-product.

Flotation, Developed at Valley Forge, Allows Utilization of Low-Grade Rock

THE plant of the Valley Forge Cement Company at West Conshohocken, Pennsylvania in recent years has become a shrine or "Mecca" for cement men from all parts of the world. It was at this plant that C. H. Breerwood and his associates developed the Breerwood flotation process which is probably the most important single development in the production of cement since the advent of the rotary kiln, if not in the entire history of the industry. Briefly, this process makes possible the production of a cement-kiln feed of correct chemical and physical composition from available raw materials which may be inferior or actually unusable in conventional methods of manufacture. It has been applied to seven cement plants in this and foreign countries and a large plant now under construction in the Lehigh Valley was designed around this process.

The complete process is a combination of grinding, classification, flotation and thickening methods, with froth flotation the principal step. In each installation each step is adapted to satisfy the specific requirements of cement chemistry and the peculiar characteristics of the available raw materials. The purpose of the process is to beneficiate the available materials by correcting the proportions and ratios of the mineral sources of the four oxides essential for the production of any Portland cement by removing the necessary proportions of these oxides from the mixture. When harmful or useless impurities are present in the available raw materials these are also removed in any desired proportions.

In this article an attempt is made to give the reader a picture of the development of this process and its application at the Valley Forge plant where the processing is the most complex of any yet attempted. In this plant the flotation system has lowered quarry and raw- and finish-grinding costs and has been responsible for better kiln performance.

By W. E. TRAUFFER

The rock in the Valley Forge quarry is a metamorphosed argillaceous limestone of the Jacksonburg formation, the same formation as that of the Lehigh Valley cement rock. It has a similar oxide composition but contains very little graphitic carbon, its crystallization is considerably coarser, and there has been some alteration of the silicates. The various strata in this quarry vary widely in composition, but the principal minerals in them are calcite, quartz, muscovite mica, phlogopite mica, limonite, pyrite, pyrrhotite and dolomite. Some of the rock runs well over composition and it was on this material that the plant was able to operate until 1934 without bringing in rock from outside sources. Since the flotation process has been perfected the lower grade rock has been used and old spalls in the quarry have been cleaned up. At present the grade of the quarried rock averages about 71 to 73 per cent. $CaCO_3$.

Like the Lehigh Valley cement rock, this material was deficient in calcite and crystalline silica and excessive in

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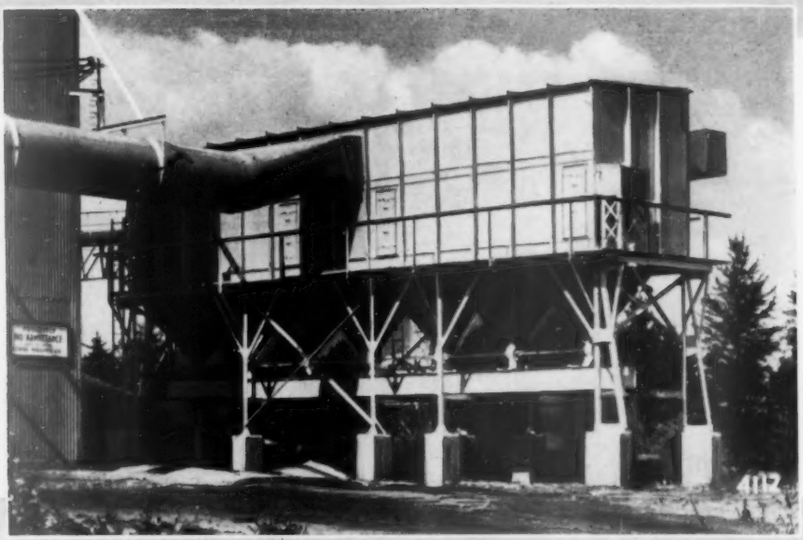
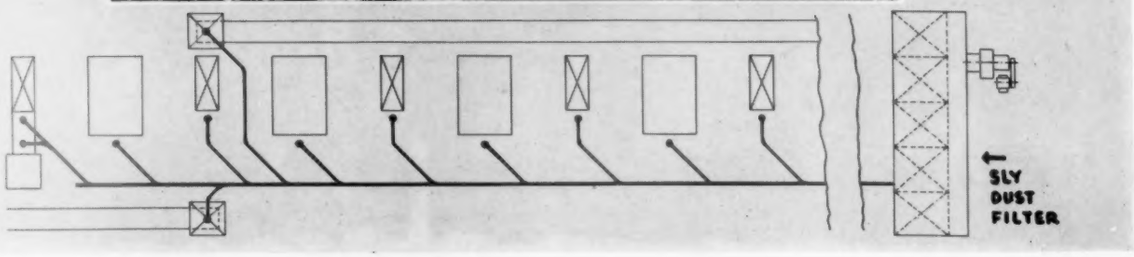
SLY DUST CONTROL



Sly Dust Control at the Staso Milling Co., Pembine, Wis., producers of granulated roofing stone.



This Sly Dust Filter in a stone crushing plant is connected by a suitable system of piping to the various sources of dust—crushers, screens, conveyors and elevators.

The dust-laden air is drawn into hoods at these points, thence through the piping into the filter where the dust is filtered out and easily disposed of—resulting in a clean plant and protection to employees in both health and safety.

The exclusive advantages offered by Sly Filters are: (1) *Greater filtering capacity* because of more filtering cloth. (2) *Taut bags* at all times, saving power and resulting in quicker removal of dust. (3) *Bags* more easily replaced. (4) *Automatic control* (any degree) minimizing or removing the human factor. (5) *Simpler shaker mechanism* resulting in savings in maintenance and operation.

Hundreds of companies have found that Sly Dust Control soon pays its cost by improved efficiency of workmen, savings in wear and tear on machinery and improved quality of products. Write us fully so that we can tell you just what can be accomplished in your case.

That the advantages of Sly Dust Filters—their savings in space, power, and maintenance—are widely appreciated in the Cement Industry is evident from the fact that Sly is a 4 to 1 favorite in this industry.

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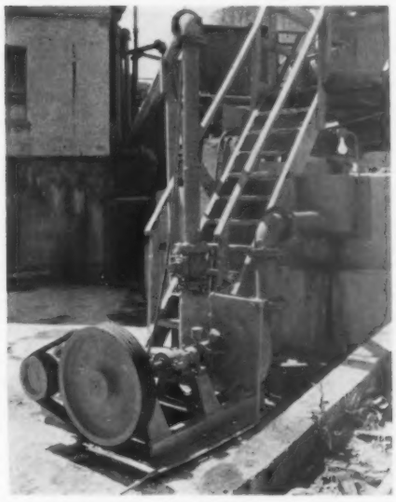
total silica, alumina and magnesia. The iron content was about right but, as a part of the natural iron occurs as compounds of sulphur, it is preferred to substitute oxide of iron when the recovered products are deficient in this material for the manufacture of a specific type of cement, such as low-heat, and to discard the sulphur compounds.

While the Breerwood flotation process has been in use on a commercial scale less than eight years, the events which led up to it began when the Valley Forge plant was built in 1928. This plant at that time was far in advance of current practice, especially in



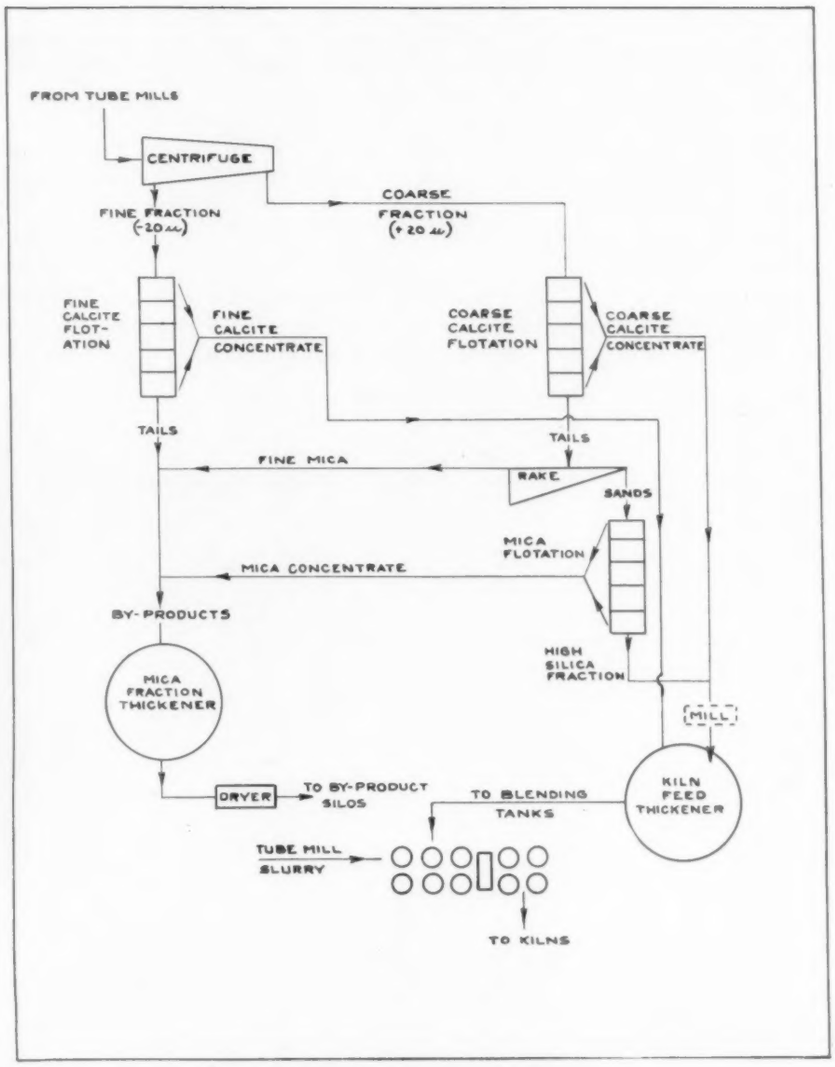
Pump which conveys the fine fractions from the centrifuge or hydroseparator to the fine-calcite flotation circuit.

its system of wet raw-material blending. At that time six blending tanks were used for the mill stream, three being held high and three low. Slurry was withdrawn from two or more of these tanks into any one of four kiln-feed tanks. While one of these tanks was being filled, the content of a second was being mixed, a third was being checked and the kilns were being supplied from the fourth.

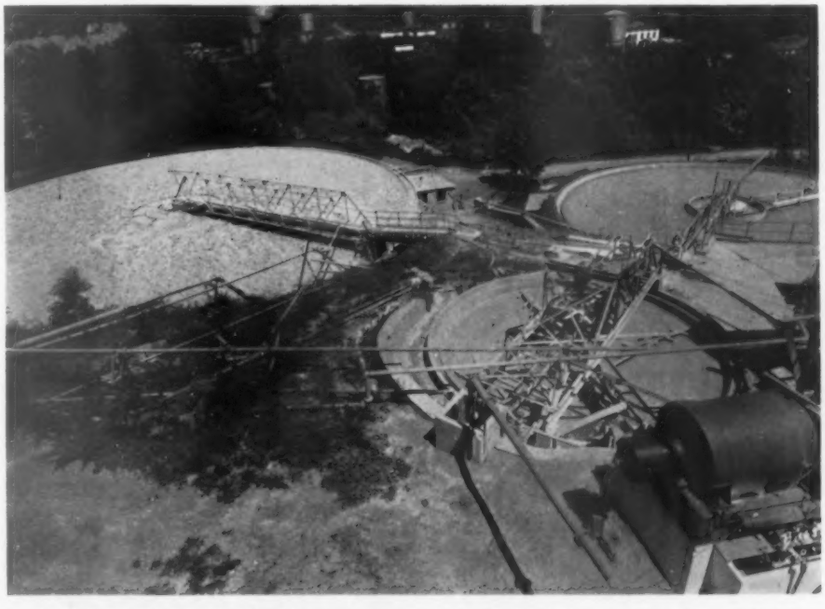
This was a very flexible blending system and probably as accurate as many systems now in use in the industry. A change of type of cement could be made within 8 hours, the capacity of one of the tanks.

Further to insure a uniform feed to the kiln the entire deposit was core-drilled and analyses were made every 5 feet of hole. The quarried stone was kept in separate storage piles and two feed bins for each of the raw mills made further blending possible. Analyses were made of samples of the raw material going into storage, and the mill stream was sampled hourly.

With all these precautions it was possible to hold the kiln-feed composition within 1 or 2 tenths of 1 per cent., but nevertheless there was some



Flow-sheet of flotation operations.



The classification and thickening equipment from the mill-stream slurry-storage tank.

An Automatic Direct-Firing System that is revolutionizing cement kiln firing

Change-overs from bin-fed to direct-fired systems are not new in the cement industry. But when Whiting Impact Pulverizers . . . used for many years in foundries . . . were first installed in cement plants, a new standard of pulverizer performance and kiln-firing efficiency came upon the scene.

The striking economy of Whiting Impact Pulverizers starts with their unusual compactness. They can be installed without the remodeling of old plant structures. Furthermore, they are lower in first cost than the older types of pulverizers. Finally, they consistently reduce fuel consumption and increase kiln yield. These facts are demonstrated daily by operating records of Whiting Impact Pulverizers in several cement plants.

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The Whiting Impact Pulverizer requires less space than any other type of fuel pulverizer. Note, below, how Whiting Pulverizers can be installed near raw fuel bins without plant alterations.

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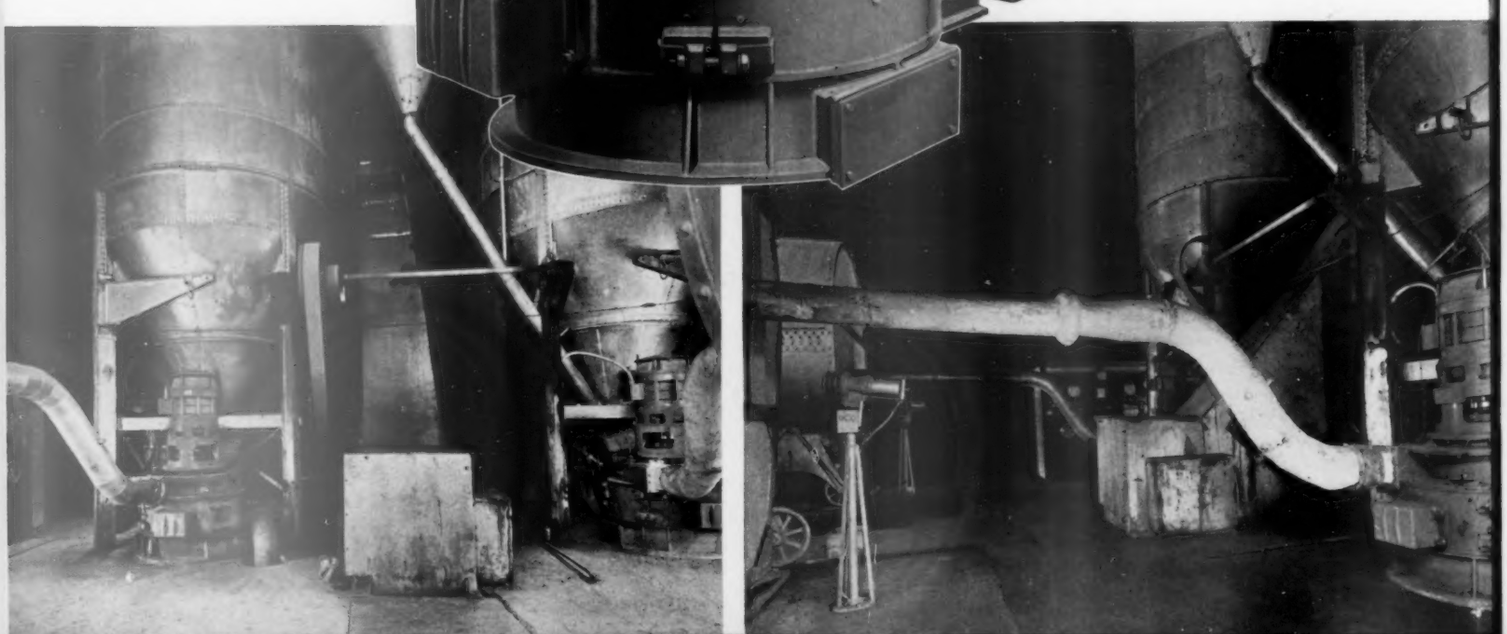
The response to the photo-cell control is so instantaneous that "gas-flame" steadiness is obtained. Eight per cent less fuel and 10% more yield are not unusual.

SAVES LABOR

High pulverizing speed and precision control assure a steady, non-pulsating flame that requires no close supervision.

SAVES MONEY

Elimination of costly plant alterations (to make room for pulverizers) and low first cost are important money-savers. Economy in fuel and improvement in kiln yield are additional dividend producers.



TYPICAL WHITING DIRECT-FIRING INSTALLATION IN A PENNSYLVANIA CEMENT PLANT

WHITING IMPACT PULVERIZERS

variation in the uniformity of the cement and 7-day tensile strengths varied as much as 50 pounds. Mr. Breerwood traced these variations to incomplete lime-silica saturations due to the presence of coarse quartz in the kiln feed. It was also determined experimentally that quartz over 45 microns or 325-mesh does not react favorably, if at all, in burning, and that uniformity would be improved by the reduction of the coarser fragments of calcite, and limiting the extremes in range of particle sizes of all the constituents of the final mixture

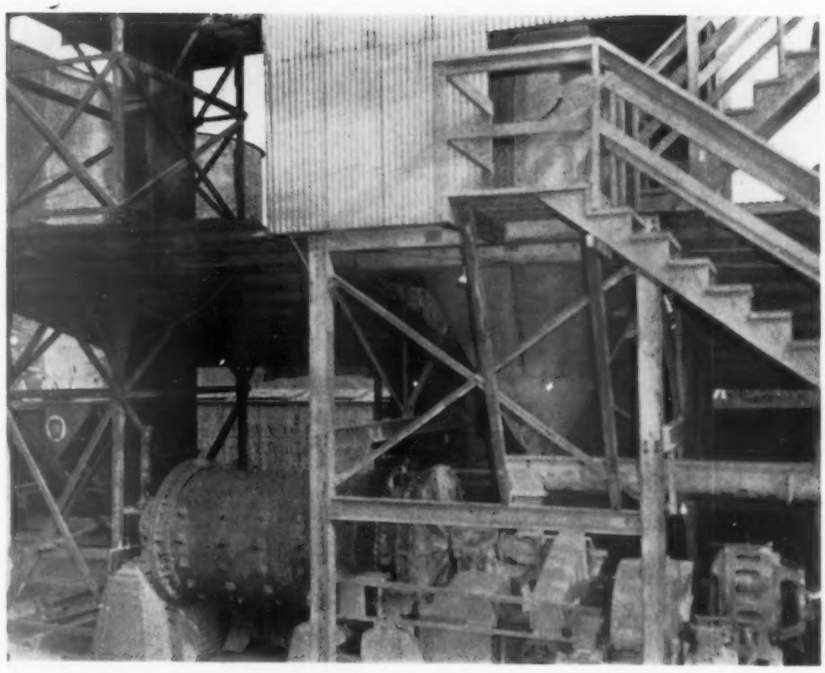
Various methods were investigated and a technique was finally discovered whereby calcite could be separated from quartz and other argillaceous constituents by froth flotation. In 1932 a pilot plant was put in operation in the Valley Forge kiln room in which 12-inch American Cyanamid Fagergren flotation cells of the precious-metal type were used in rougher, scavenger and cleaner circuits. Classifiers and thickeners were also used in this plant. In over a month of operation the pilot plant produced enough material to keep one kiln operating at full capacity for 24 hours.

The result of this large-scale test paralleled experimental work in showing that increased strength was obtained by the elimination of coarse quartz. Experimental work with the tailings also showed that silica, iron and aluminum silicates (mica) could be segregated mechanically either by classifiers or concentrating tables.

The pioneer commercial flotation plant at Valley Forge went into operation March 15, 1934. It was designed to make both physical and chemical corrections and to serve as a blending system as the underflow of the thickener was held uniformly at composition regardless of variations in the composition of the mill stream. The mill slurry was first classified, the overflow of the classifier being the principal source of argillaceous constituents. This overflow was slightly high in total silica because of the tendency of the fine mica to go with the classifier overflow. As the overflow was nearly all minus 325-mesh material, little or no coarse quartz was present in the unfloated fraction of the mill stream. The classifier underflow, nearly all plus 325-mesh material, was used as the feed for the flotation circuit.

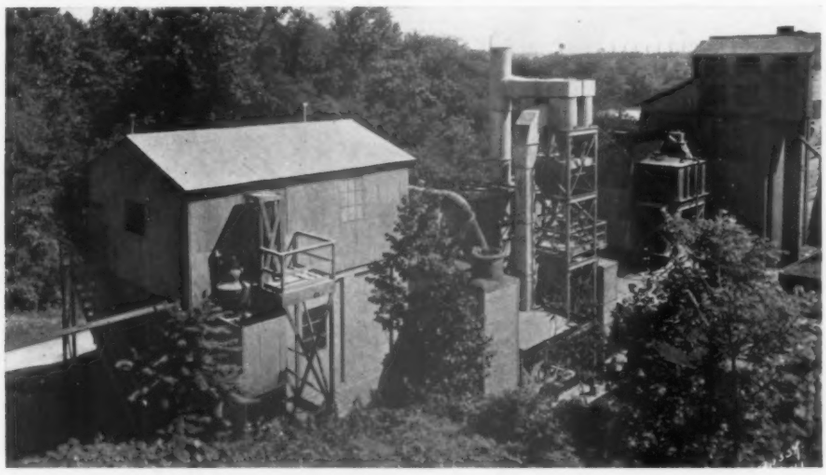
In the flotation department three circuits were originally used. The first, or rougher, circuit made rougher concentrates of lime as a finished concentrate. The tailings from these rougher cells were again floated with increasing quantities of collecting reagents in order to concentrate the remainder of the calcite grains. This concentrate was relatively lower in grade than the rougher concentrates and was accordingly refloated in a third circuit of three cells without the addition of reagents in order to produce a froth concentrate equal in grade to the product of the rougher cells. The tailings of the three cleaner cells were returned to the first circuit as a middling, forming a closed circuit.

The tailings of the flotation plant were largely coarse quartz, iron pyrites and sericite and phlogopite mica. By varying the relative weights of the classifier overflow and underflow and consequently the proportion of rock concentrated, inversely but not pro-



The ball-mill which reduces dried waste mica and air-separator serving the mill.

Pump which forces fine calcite concentrates from the sump to the 125-foot thickener.



The rejects drying plant. The thickener rejects are first pumped to the building at the left.

portionately as the mill-stream analysis changed, the continuous remixing of the concentrate with the fine overflow from the classifier in the final thickener resulted in a thickener underflow which was approximately at composition. A small concentrating table was installed experimentally to separate

A rear view of the centrifuge.

The centrifuge and storage tanks. The central tank is used for storing the mill-stream slurry. The tank at the right is for storage of the circulating water of the flotation, classification and thickening circuits. The tank at the left holds make-up water.

the micas from the quartz and iron compounds, but as it was determined that satisfactory mica separations could be made by simple hydraulic classification of the flotation tailings, the rake classifier was used for this purpose. The quartz and iron recovered as classifier sands or underflow were too coarse for a satisfactory kiln feed and were returned to the mill for further grinding.

The mill stream had a fineness of approximately 85 per cent. through 200-mesh. The elimination of the coarse quartz raised this to 92 per cent. The latter fineness, however, was not equivalent to a natural grind, since this process removed all the quartz over 325-mesh in size. The plus 325-mesh material was largely calcite. The alumina content was reduced about 1 per cent. by this process.

At this point it might be advisable to state that there has been considerable confusion in evaluating the degrees of separation which are made at Valley Forge. According to that company's experience, the only logical estimation of the efficiency of the metallurgical results should be based on the quantity of useful minerals lost with the waste products, more particularly the loss in lime and fine silica. The loss in lime varied between 0.7 and 1.0 per cent. of the total mill stream. It is possible that this degree of separation efficiency was greater than warranted by the cost of the power necessary for grinding as finely as was done in the operations of this first commercial circuit. This was, however, a natural attitude in a locality where a high-grade limestone costs more than $2 per ton delivered at the plant and in the beginning it was difficult to realize that the limestone discarded in the waste represented only the comparatively small cost of quarrying and grinding.

The next important discovery made at this plant was that aluminum silicates, such as mica, could be separated as a flotation concentrate from both the quartz and the calcite by the use of cationic flotation circuits. A du Pont reagent, which consists of a mixture of amine hydrochlorides, is used in very small increments at each of the two

Coarse-calcite flotation circuit with rake classifier for removing fine, suspended mica in the background. The fine-calcite flotation circuit is in the room at the right.

Fine-calcite flotation circuit, handling the centrifuge effluent or hydroseparator overflow. Both rows receive the same feed.

Mica (cation) flotation circuit. The two rows of cells receive the same feed.

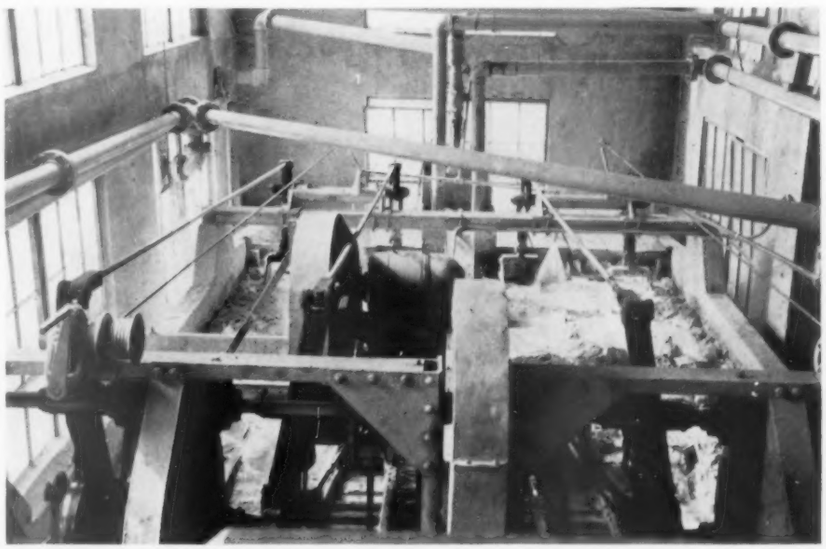
rows of five cells in series as a "stage-oiling circuit". A total of only .05 pound is being used per ton of rock fed to the circuit. Larger quantities will float the quartz as well as the alumina and magnesium silicates.

This circuit was used chiefly to reduce the alumina since the tailings of this flotation circuit have a high silica ratio. The concentration and removal of mica by flotation had the incidental advantage of making a substantial reduction in the magnesia and in the alkalies which, in this material, are combined in the micas. The rake classifier, which was used in place of the concentrating table, was highly effective in removing the fine mica, but the coarse mica settled with the other tailing minerals. The rake was therefore retained in the circuit and the cationic flotation circuit was added to the basic circuit to treat the rake sands or underflow and to eliminate substantially all the remaining mica. The tailings of this flotation, rather than the concentrates as in the calcite flotation circuit, are the recovered products. The sulphur compounds of iron are readily floatable with the micas, and the operators prefer to let these go to waste and to make up any deficiency by substituting oxide iron. The recovered products or tailings comprise the high-silica ratio component of the kiln feed. This operation at the Valley Forge plant is believed to be the first commercial use of cationic reagents for the separation of any mineral.

Later, when it became evident that it was desirable to produce cements lower in tricalcium aluminate, a third flotation circuit was imposed on the basic existing circuit to increase the removal of mica. The fine fractions of the mill-stream slurry, comprising the first classifier overflow, had previously been allowed to flow directly to the kiln-feed thickener, where they were mixed with the recovered products of the flotation circuits. The relative proportion of mica to other minerals is so increased in these fine fractions, because of the slow settling rate in water of even relatively large mica particles, that the separation of the calcite by flotation would leave a micaceous tailing in which the proportions of useful minerals would be too low to justify their recovery. The classifier overflow is, therefore, transported by a Millville pump to the third series of flotation cells, where the calcite is concentrated as a froth which flows by gravity to the final thickener, and the tailings are discarded. The fineness of the classifier overflow was all minus 325-mesh, with about 60 per cent. minus 10 microns. It had been the belief of flotation experts that successful flotation separations could not be made between mineral particles of such extreme fineness. The results obtained since this circuit was started in the spring of 1940 show that it is possible to parallel the results obtained in the other circuit processing the coarser fractions. This is largely attributed to the use of small quantities of collecting reagent added in small increments to each of five cells in a "stage-oiling circuit". As the concentrates are of about equal grade, froth cleaning is not required.

In order to make cements low in tricalcium aluminate at Valley Forge the only requirement is to make a substantial reduction in the proportions of the two micas. This necessarily increases the proportions of lime, quartz and oxide of iron, and sharply reduces the proportions of alumina and alkalies, the latter being combined in the aluminum silicates. It also reduces the magnesia in the form of phlogopite mica and the sulphur in the form of iron pyrites and pyrrhotite which are floated with the mica. This is the net result of the present operations, the three discarded products of the process being largely micaceous.

Experiments on a commercial scale at Valley Forge prove that the same final result in reducing the proportion of mica can be obtained in a single flotation operation and without concentrating the lime. The most effective and practical circuit comprises only a centrifuge in place of the mill-stream classifier and a single flotation-cell circuit. The centrifuge would be operated to split the slurry at about 10 microns. The fine fractions would flow directly to the thickener. The coarser fractions would be sent to the flotation circuit, where the mica would be floated by the use of the cationic reagent and discarded, and the tailings would be recovered and mixed with the untreated



Rake classifier which revives fine mica waste from the feed to the silicate-flotation cells.

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Buell's present position in the field of mechanical dust collection for the rock products industry is the result of the exclusive van Tongeren design (offered only in Buell Dust Collectors) which utilizes the energy of the "double eddy current" phenomenon to produce a high collection efficiency without having to resort to small diameter cyclones.

Buell's use of large diameter cyclones produces two important results:

1. ***It permits the use of heavier metal (3/8" thick) for extra long life and negligible maintenance.***
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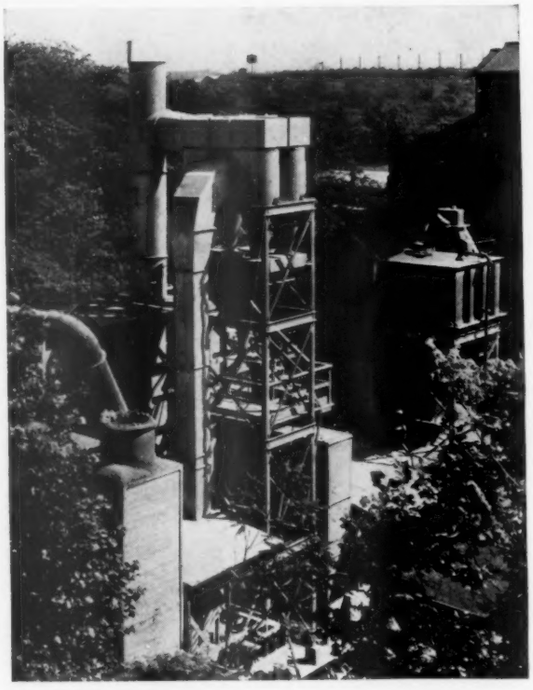
Buell (van Tongeren) Dust Collectors, handling gas volumes from 500 c. f. m. upwards, are now in successful operation with Kilns, Dryers, Raw Mills, Finishing Mills, Clinker Coolers, Waste Heat Boilers and Asphalt Plants.



Four Buell collectors on stone dryer in cement plant.

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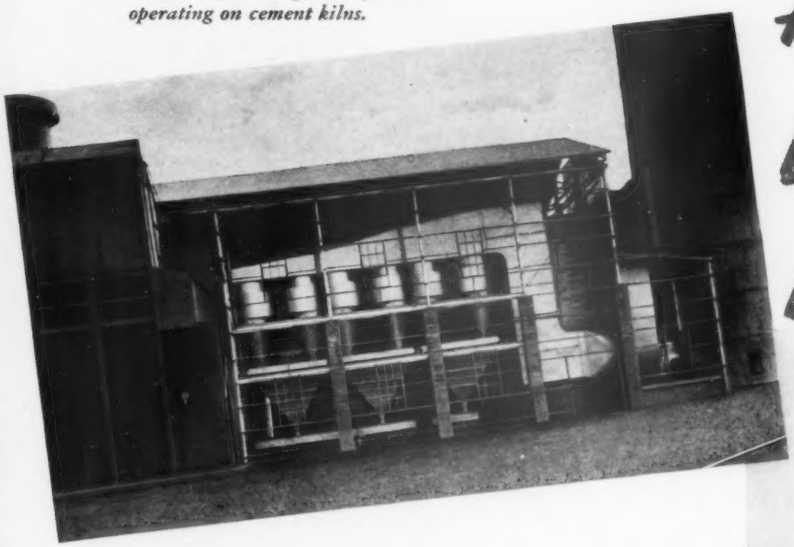
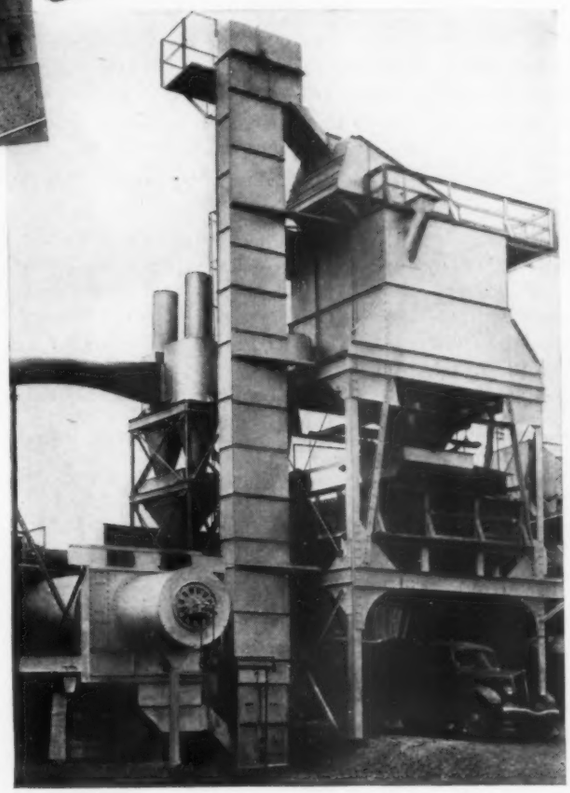
Bank of twenty-four 4' 6" diameter Buell (van Tongeren) cyclones operating on cement kilns.





Two Buell (van Tongeren) cyclones in asphalt plant.

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ON LONG HAULS Use TOURNAPULLS

Tournapulls are available from 90 to 400 h.p., for use with Carryalls from 11 to 42 heaped yards capacities. Here, an LS (11 heaped yards) Carryall and 90 h.p. "Caterpillar"-powered Standard C Tournapull get a capacity load quick. Between Tournapull trips, the 'Dozer keeps busy doing short-haul stripping, clearing stumps and yanking out boulders.

TOURNAPULLS extend the low net-cost-per-yard performance of LeTourneau Carryall Scrapers to long hauls, beyond tractor range. They get heaping loads fast with the aid of a pusher, haul at truck speeds and spread their loads on the move with typical Carryall efficiency . . . all in one continuous, low-cost operating cycle.

Tournapulls have plenty of surplus rimpull to enable you to accelerate to top speed in a hurry and to carry you through tough spots. In short, you gain profit-making seconds all along the cycle —loading, traveling and unloading. Results: high average speed and more big loads moved per hour on your long haul stripping and materials-handling.

Another Profitable Use For Tournapull Power

With the same Tournapull power you can haul aggregates from shovels and stockpiles by hooking onto a Tournatrailer—fast-moving, end-dumping hauling unit, built especially for long haul work, where pits are widely separated from the plant. Changeover from Carryall Scraper to Tournatrailer on the Tournapull is quickly and easily made. Both Tournapulls and Tournatrailers are equipped with large-diameter rubber tires that enable them to travel across highways without damage to paved surfaces. Thus, with Tournapulls you get speed, plus mobility to handle all phases of pit and quarry stripping and materials-handling fast, and at low costs.

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"Caterpillar"- powered C Tournapull with W-10 Tournatrailer (12 heaped yards), takes to the paved highway. Note how the big tires "cushion" the load, prevent damaging the pavement. Here's a fast way to deliver big loads of aggregates. Tournatrailers come in 5 models, from 12 to 35 heaped yards.

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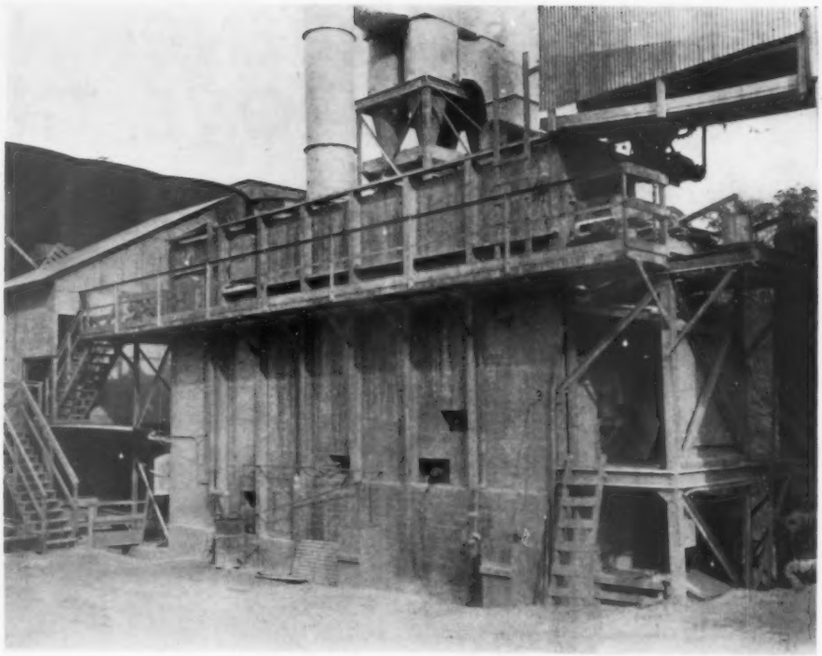
* Name Reg. U. S. Pat. Off.

Drum-type filter which converts waste mica into cake for feed to the drier.



Another view of the waste-mica processing plant showing the grate-type drier and dust-collector.

fines in the kiln-feed thickener. Although there are no technical difficulties involved in this simplified flow-sheet, the present cost of the cationic reagent makes the present circuit somewhat more economical to operate. The latter, although apparently complicated, is simple and flexible in operation.

With the present system it is possible to make all five A.S.T.M. types of cement and those meeting Federal-government requirements without adding any outside materials except iron and high-ratio silica when making low-heat or sulphate-resisting cements. Because of the accuracy with which the analysis of a cement could now be controlled it was decided to make a standard Portland cement for commercial use which would also conform to the specification requirements for A.S.T.M. Type 2, and Federal SS-C-206 cements. Such a cement meets the various state highway specifications and is accepted by most other users. The process results appear in the tables of raw-material and cement analyses that are given at the close of this article.

In the previous flow-sheet the ground rock to be treated was first fed from the tube-mills to a Dorr hydroseparator, principally to provide two fractions of limited particle-size ranges to be concentrated in separate flotation circuits. The coarser fractions were divided into equal parts, each part being sent to a battery of five flotation cells where a frothing agent and a fatty-acid type of collecting reagent were used. The concentration is made in a controlled "stage-oiling circuit" in the presence of a total of 0.3 to 0.4 pound of the fatty acid per ton of feed. This coarse calcite concentrate was the first completed product of the process.

The tailings from these rougher cells went to a Dorr rake classifier, where they were hydraulically classified to take advantage of the slow sedimentation rate of the mica particles. The finer suspended micaceous matter overflowed the rake and formed the first waste product.

The underflow of the rake classifier, representing an average of 10 to 15 per cent. of the weight of the mill stream, was subjected to flotation in a battery of five cells in the presence of a total of 0.05 pound of a cationic flotation reagent per ton of feed. The remainder of the free micas and the pyrite was concentrated in the froth and formed the second waste product.

The tailings from these cells formed the second recovered product of the process but required further grinding to make them suitable for burning.

Except when compositions for sulphate-resisting cements were being prepared, in which case all the finer fractions overflowing the hydroseparator were subjected to flotation, a part of

Slurry-feed tank, centrifuge and hydroseparator. The building at the left houses the rake classifier used to overflow the suspended fine mica.

Pumps which feed coarse calcite flotation tailings to rake.

FULLER AIR-QUENCHING COOLERS PROVE THEIR WORTH

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Bulletin CO-2 illustrates and describes Fuller Air-Quenching Coolers . . . we'll send you a copy upon request.

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Repeat order	4
Company No. 2	
Initial installation	1
Repeat order	1
Company No. 3	
Initial installation	1
Repeat order	1
Company No. 4	
Initial installation	4
Repeat order	5
Company No. 5	
Initial installation	3
Repeat order	3
Repeat order	2
Repeat order	1

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the first classifier overflow was required as a source of argillaceous minerals and was delivered to the thickener as the third recovered product of the process. The remainder of the finer fraction was subjected to flotation in two rows of five rougher cells each in the presence of a fatty-acid type of collector to form a fine calcite concentrate which formed the fourth recovered product.

The tailings from these cells were highly micaceous and so low in calcite that they were discarded as the third waste product.

All the recovered products were continuously delivered to the thickener and recombined to form the ultimate mixture, or the major proportion of a mixture to be completed finally by the addition of a small quantity of silica.

The principal addition to the above basic circuit was the new circuit consisting of two rows of five 66-inch American Cyanamid Fagergren flotation cells. These concentrate the calcite from the primary classifier overflow which was originally the untreated finer fraction. Improved reagents and flotation technique made it possible to produce a concentrate containing 88 per cent. $CaCO_3$. The tailings of this circuit are approximately 50 per cent. micaceous and contain about 16 per cent. $CaCO_3$. These tailings are transported by a Millville pump to the 80-foot thickener as a waste product.

A Bird No. LB160 centrifuge, with a capacity of 1,200 tons of mill stream in 24 hours, was substituted for the hydroseparator which made the primary classification. The centrifuge makes a much cleaner separation of the fine and coarse products and makes the split at a much lower point in the particle-size range.

The principal objective was to increase the proportion of fine quartz in the coarser fraction so that it could also be recovered as a tailing of the cationic flotation circuit which is the source of the high-silica-ratio fractions. To this extent the centrifuge performs a definite mineral-separation operation.

An incidental advantage is that the flotation feed to the calcite- and mica-concentrating circuits now contains little or no colloidal or ultra-fine matter and the flotation separation, as a result, is more efficient than formerly.

Three reagents are now being used. Oleic acid, or its emulsions, is used at the rate of 0.3 to 0.4 pound per ton of cell feed for collecting calcite. Only .03 pound of frothing agent is required per ton of feed as the water is re-used in closed circuit. The cationic reagent is used at the rate of 0.05 pound per ton of feed.

This expanded circuit differs from the original in that, for simplicity in the control of the composition, the underflow from the final thickener is maintained between 80 and 82 per cent. $CaCO_3$ with the alumina at about 1.8 per cent. and a low percentage of alkali and sulphur. This is done so that kiln-feed compositions to produce any of the five types of cements can be prepared by blending various proportions of untreated tube-mill slurry, iron if necessary, and sand when making low-heat or sulphate-resisting cements. The product of the kiln-feed thickener goes to the 6 slurry tanks forming part of the original raw-blending system. There tube-mill slurry, sand and iron are added as needed.

All five types of cements have been made successfully with the present flotation system with the exception of high-early-strength cement which the company does not wish to make at this plant. The flotation department is now operated only 18 days per month to keep the kilns operating at their full capacity.

The combined micaceous rejects of the process plant, which are now being dried and sold, consist of the fine mica overflowing the final classifier, the micaceous tailings of the lime-flotation circuit following the centrifuge, and the coarse mica concentrate of the silicate-flotation cells. This material amounts to about 100 tons daily.

All these rejects go to the 80-foot diameter Dorr thickener which was formerly used for the recovered products. The thickener underflow is transferred by a Wilfley pump to a filter at the drying plant. The Dorr-Oliver drum filter makes a cake which is carried on a belt-conveyor to a Fuller grate-type drier. The material first drops on a drying pan, over which it is moved by a continuous drag-chain. Under this is a second pan, on which the material drops and is carried back to the feed end by the return flight of the chain. The material then drops on a staggered grate arrangement similar to that in a Fuller cooler with the hot air going both through and over the grates. The exhaust gases pass through a 4-cell Buell dust-collector from which the collected dust is fed back into the circuit.

In passing through the drier this material has a tendency to form nodules and these are broken down by a small wet-grinding cylindrical ball-mill which operates in closed circuit with a Bradley 10-foot air-separator. This drying-and-grinding circuit reduces the coarse material without injuring the mica by over-heating, which might cause exfoliation. A Fuller-Kinyon Type H pump feeds this material to a bin from which it is loaded into hopper cars or bagged.

These dried and ground rejects are now being sold for use as asphalt filler in the manufacture of shingles, sheets, blocks and a number of other products. This material contains more than 50 per cent. mica, which could be refined to a high degree of purity at small expense.

The present circuit went into commercial operation in April 1940, the only change having been the substitution of the Bird centrifuge for the hydroseparation. Typical results are given in the two following tables which show respectively the analyses of the recovered products and the waste, or by-products. These data are representative of the separations that can be expected when processing an especially low grade rock, the analysis of the mill stream being 66.1 per cent. $CaCO_3$, and were obtained in August 1940.

RECOVERED PRODUCTS

	Plant Feed	Coarse Concentrate	Fine Concentrate	Silica Recovery	Combined Recovery
Tons per 24 hours	1,106	496	264	80	840
Percentage of Feed	100.0%	44.9%	23.8%	7.24%	75.94%
SiO_2	19.3	5.7	4.6	53.4	9.9
Al_2O_3	5.7	1.5	1.4	7.1	2.0
Fe_2O_3	2.0	1.6	1.7	2.5	1.7
$CaCO_3$	66.1	86.4	86.7	31.4	81.3
$MgCO_3$	6.7	6.2	5.8	4.4	5.9
Total	99.8	101.4	100.2	98.8	100.8
SiO_2/R_2O_3	2.51	1.84	1.48	5.56	2.67

REJECTS OR BY-PRODUCTS

	Plant Feed	Overflow Mica	Mica Concentrate	Fine Tailings	Combined Rejects
Tons per 24 hours	1,106	45	98	123	266
Percentage of Feed	100.0%	4.06%	8.80%	11.2%	24.06%
SiO_2	19.3	46.3	51.1	48.5	49.0
Al_2O_3	5.7	13.3	17.3	17.6	16.8
Fe_2O_3	2.0	2.5	4.3	2.9	3.3
$CaCO_3$	66.1	27.4	16.0	16.7	18.2
$MgCO_3$	6.7	8.4	9.0	10.5	9.6
Total	99.8	97.9	97.7	96.2	96.9
SiO_2/R_2O_3	2.51	2.93	2.37	2.37	2.44

The average composition of the commercial cement produced from April to September of 1940 satisfied the requirements of Federal Specification SS-C-206 for Moderate-Heat-of-Hardening Cement, but the clinker was not usually ground to the fineness of the specification. The average analytical

Product Control

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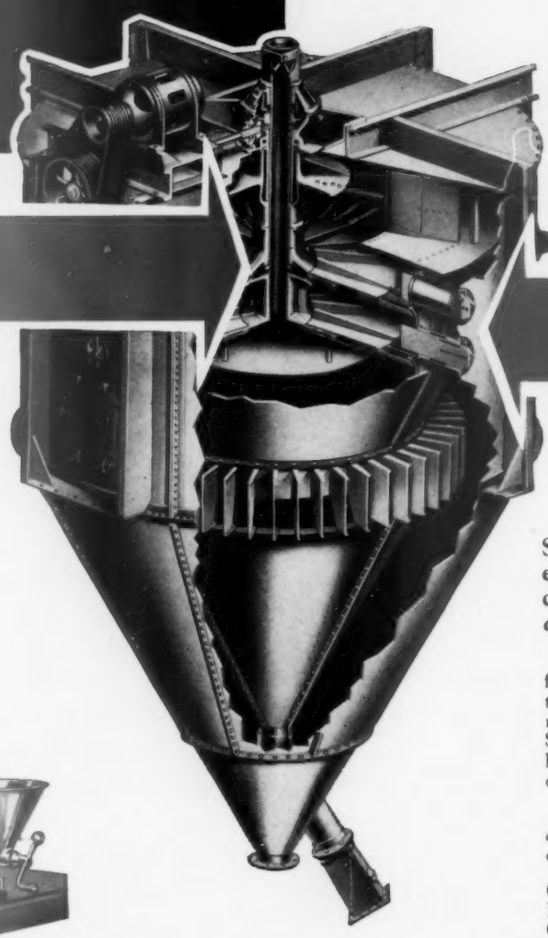
RAYMOND DOUBLE WHIZZER AIR SEPARATOR



Two sets of revolving whizzer blades assure closer particle selection for greater product uniformity.

Sliding dampers provide instant fineness control. Adjustable from the outside while separator is in operation.

For Tests

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Cement	Diatomaceous Earth
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Gypsum	Slate
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Pumice	Clay
Feldspar	Silica

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In the cement industry, the Single and Double Whizzer Type Raymond Mechanical Air Separators provide for every requirement in classifying standard and high early strength cements.

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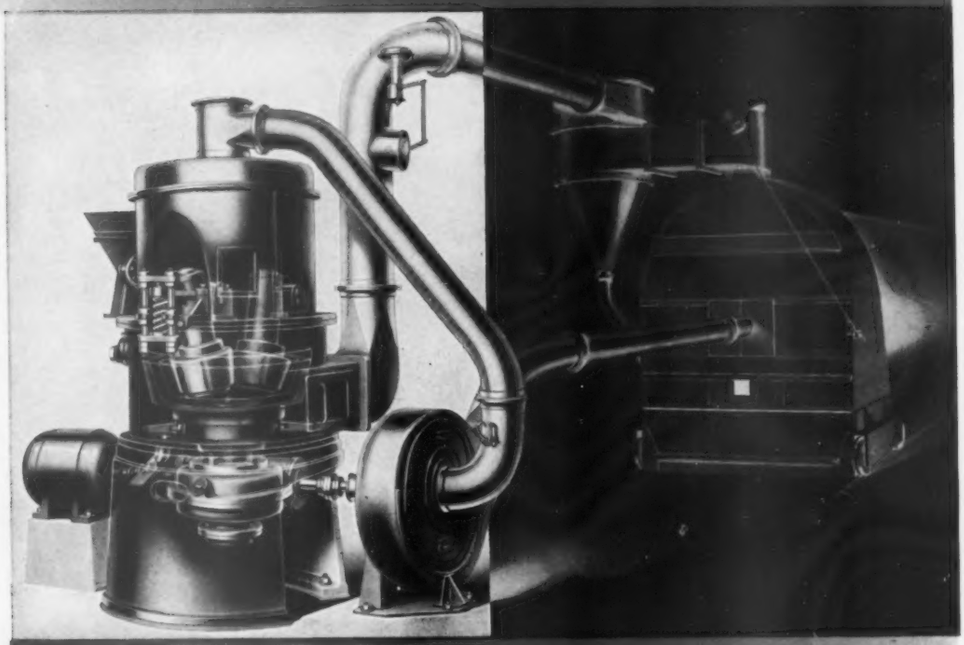

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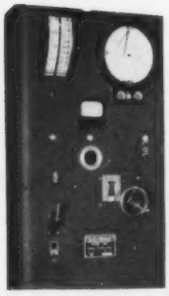
Complete operating panel board includes all controls for pressure, draft and rate of feed. Provides graphic record of the Bowl Mill performance.



The success of the Raymond BOWL MILL is told by its own records:—

Six years on the market . . . and more than 500 units sold for direct firing . . . over 30% repeat orders . . . mills operating in 28 states and several foreign countries . . . on furnaces, boilers, lime, cement, dolomite and other kilns.

It is the modern Direct Firing Unit with an all-time low in coal preparation costs. Ask for Catalog No. 43.

- Handles any grade of coal
- Noiseless, dustless operation
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Phone the nearest American Blower Branch Office or write today for a list of complete installations in industries similar to yours, and our descriptive Bulletin No. 3424.

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and physical data for the entire period are given in the following table.

AVERAGE COMPOSITION OF COMMERCIAL CEMENT

(April to September 1940 inclusive)

SiO_2	21.6%	C_3S	45.0%
Al_2O_3	3.3	C_2S	28.0
Fe_2O_3	5.1	C_3A	8.0
CaO	62.3	C_4AF	10.0
MgO	4.1	Free CaO	0.9
SO_3	1.8	Sugar Sol.	9.4
Loss	1.0	Autoclave	0.44
SiO_2/R_2O_3	2.57	S. A.	1630
Factor	2.08		

	Tensile Strength (*pd. per sq. in.*)	Compressive Strength (*pd. per sq. in.*)
1 Day	158	
3 Days	287	
7 Days	377	2,657
28 Days	462	4,572

The average composition and physical characteristics of cement made to meet Federal Specification SS-C-206 are given in the following table.

SiO	21.5%	C_3S	45.0%
AlO	4.9	C_2S	28.0
FeO	3.9	C_3A	6.4
CaO	61.8	C_4AF	11.5
MgO	4.1	Free CaO	6.62
SO	1.7	Autoclave	0.27
Loss	1.2	Sugar Sol.	5.7
SiO/RO	2.45	S. A.	1890
Factor	2.04		

Compressive Strength (*pd. per sq. in.*)
7 Days, 2,920
28 Days, 5,135

Calcium Chloride Use Continues to Gain

Calcium chloride, although still largely a waste product, is gradually becoming economically important. Most of its uses are based upon its great and rapid solubility in water and upon its property of absorbing moisture from the atmosphere. Its greatest use is in road treatment, where it is employed to lay dust and stabilize dirt and gravel roads, to aid in the curing of concrete, and in ice control. Other uses are for dust and ice control of coal and coke, dust control of private grounds, in refrigerating brines, in air-conditioning, and in numerous smaller outlets.

Vigorous efforts are being made by manufacturers to develop the miscellaneous uses of calcium chloride as well as those requiring large tonnage, Alvin H. Schallis of the Bureau of Mines points out. One of the more interesting of these developments is in the dehumidification of the air in private homes. Low-cost apparatus for using the calcium chloride has been placed on the market, and it is claimed that under proper conditions the humidity can be reduced enough to prevent condensation of moisture on pipes and walls of basements, thereby preventing the formation of mould and the sensation of dampness.

GOING
GOING
GONE!
HOW TO REDUCE the toughest rock in a single pass through a DIXIE HAMMERMILL
Medium size material produced with larger openings in screen bars.
Large size product by simply changing size of screen bars.
Fine material produced in one operation.

"They go in big and come out little ones"—those tough, refractory rocks that enter the feed hopper of a DIXIE.

Every part of this super-powerful crusher is constructed to stand up under the most severe working conditions. The special moving breaker plate has 26 times the average wearing area, and the swing hammers are of manganese steel.

The DIXIE handles wet or sticky materials direct from the quarry without clogging the feed. No delays or shut-downs.

Producers who need a "sure-fire," high capacity crusher that operates on minimum costs, can rely on a DIXIE for dependable performance.

Available in 40 sizes for primary, secondary or fine reduction.

Our Bulletin gives full details

For Profitable Information about

CRUSHING • GRINDING
PULVERIZING • SHREDDING

Write

DIXIE
MACHINERY MFG. CO.
4310 Goodfellow Ave., ST. LOUIS, MO.

THREE OUTSTANDING DEVELOPMENTS:

The Vanderwerp Recuperator for Rotary Kilns

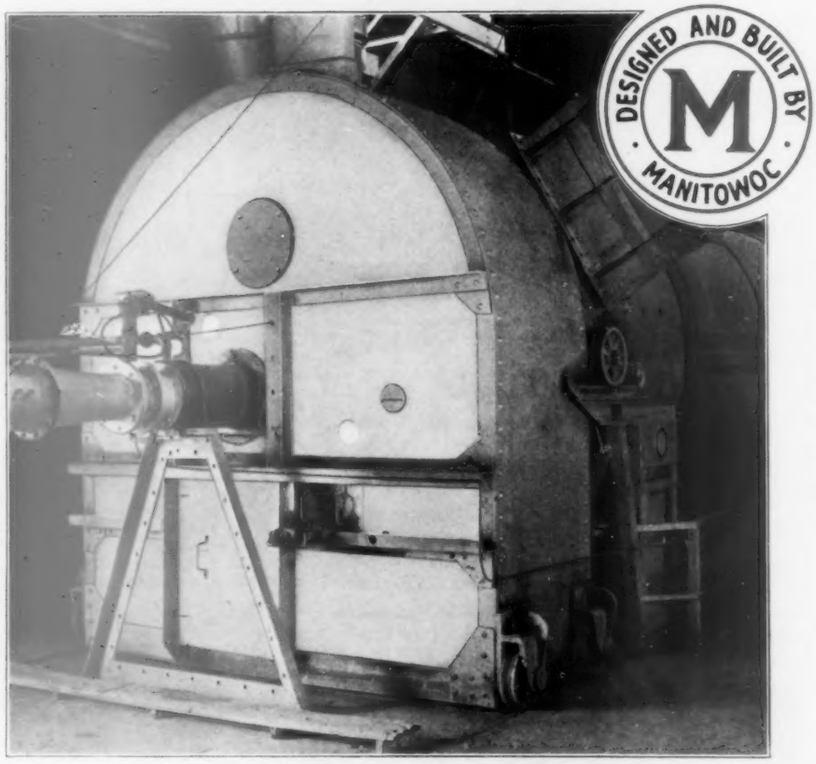
Insures immediate air quenching and maximum heat recovery.

The Minogue Slurry Agitator

Provides thorough agitation and blending with minimum power and air consumption.

The Minogue Kiln Feeder

The only practical device for introducing flue dust in the dry state.



One of a Battery of Three Vanderwerp Type F Recuperators applied to 10 ft. Rotary Cement Kiln.

Plant operators interested in obtaining maximum results with proven equipment are requested to write for full information.

MANITOWOC ENGINEERING WORKS

Division of

Manitowoc Ship Building Company

GENERAL OFFICES AND PLANT
Manitowoc, Wisconsin

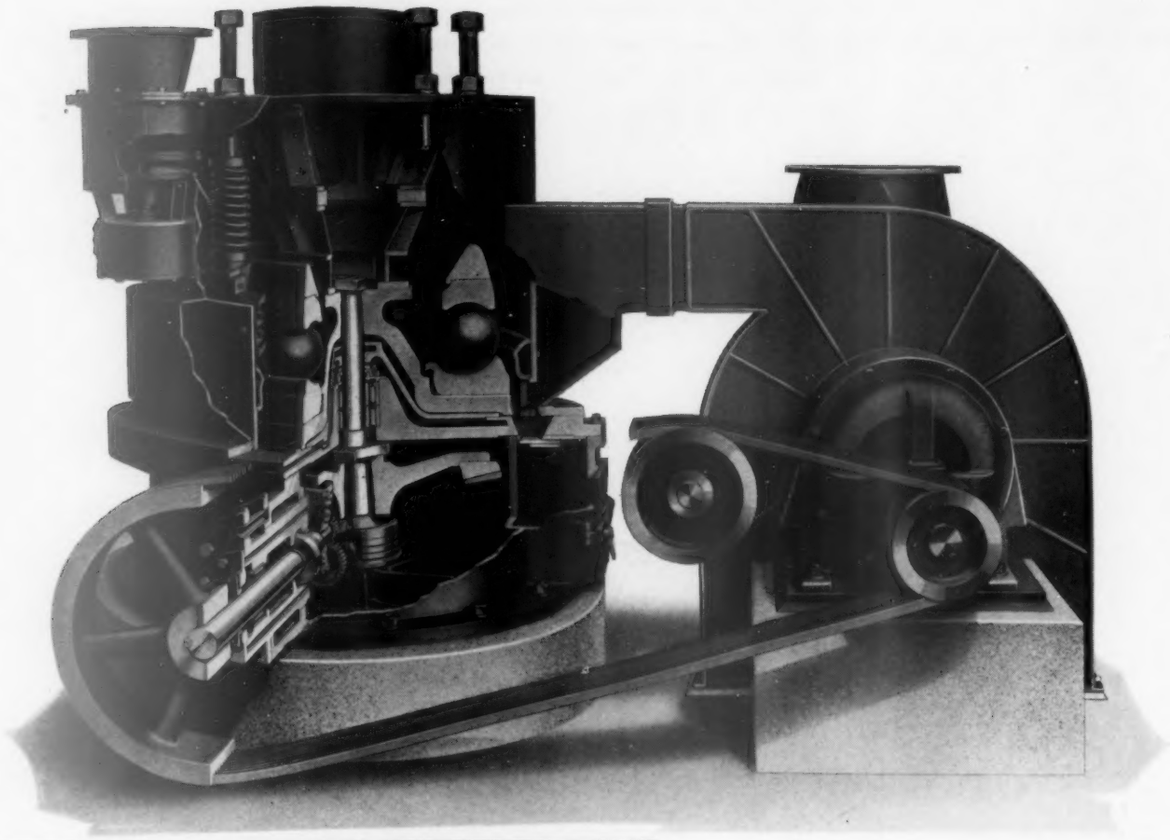
CHICAGO OFFICE
131 E. Wacker Drive

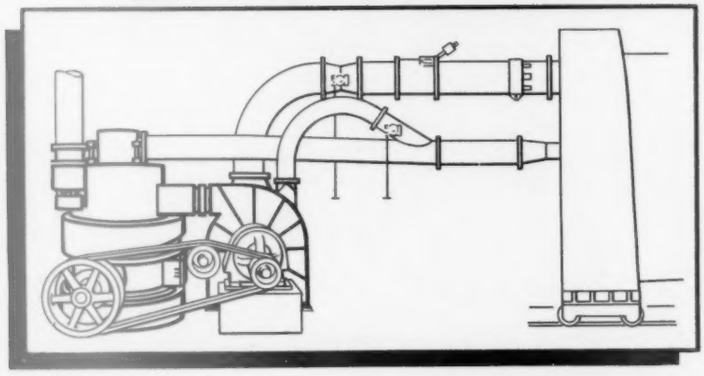
Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Ackerman James H..	vp sales	Lawrence	150 Broadway New York N Y
Ackerman Marion S..	vp		
Ackerman Marion S jr	pl m	Lawrence	Siegfried Pa
Adams E H.....	chem	Allentown	Evansville Pa
Adams George.....	eng	Edison	New Village N J
Adams J Q.....	s-t	Bessemer	Youngstown O
Adkins R S.....	g sales m	North American	285 Madison Ave New York N Y
Affelder W L.....	s	Green Bag Pa	Pittsburgh Pa
Alderton E F.....	sup	North American	Martinsburg W Va
Alexander J B.....	c chem	Southwestern	Osborn O
Alexander M Moss..	p	Missouri	St Louis Mo
Alexander V J.....	s-t	Hermitage	Nashville Tenn
Alger Joseph jr.....	sup	Great Lakes	2500 Elm St Cleveland O
Allen Arthur.....	as gm	Edison	New York N Y
Allen D F.....	vp	Valley Forge	Catasauqua Pa
Allen J C.....	sales m	Riverside	Los Angeles Cal
Andersen Peter.....	s	Northwestern States	Mason City Ia
Anderson F J.....	sup	Monolith Midwest	Laramie Wyo
Anderson L.....	s-as t	Whitehall	Philadelphia Pa
Anderson Louis.....	c chem	Alpha	Easton Pa
Anderson R W.....	chem	Oregon	Oswego Ore
Andres C S.....	sup	Lone Star (N Y)	Hudson N Y
Ansorge William A..	as t	Medusa	Cleveland O
Apt E V.....	traf m	Southwestern	Osborn O
Asplundh E T.....	vp	Pittsburgh	Pittsburgh Pa
Avnsoe T.....	vp	Lone Star	New York N Y
Ayres Warren W...	p	Lawrence	150 Broadway New York N Y
Baggot J N.....	dist sales m	Missouri	St. Louis Mo
Bagley W G C.....	t	Northwestern	Mason City Ia
Baker Daniel jr.....	vp		
Baker David B.....	vp-pa		
Baker Holmes D....	vp	Standard Lime	Baltimore Md
Baker J H.....	p		
Baker Jos D jr.....	s-t		
Baker R D.....	p	Peerless	Detroit Mich
Baldus Charles.....	t-pa	San Antonio	San Antonio Tex
Ballantyne G W....	s	Three Forks	
	as s	Arkansas	
		Colorado	
		Nebraska	Denver Colo
		United States	
		Union	
	as s-t	Ideal	
Bancroft L E.....	s-t	California	Los Angeles Cal
Barnes Thomas II....	vp-as s-t	Keystone	Philadelphia Pa
Barnett E D.....	sup	Cowell	Cowell Cal
Barr T G.....	sales m	Vulcanite	230 Park Av New York N Y
Barrackman A M...	as s-t	Monarch	Humboldt Kan
Barton J F.....	c chem	Federal	Buffalo N Y
Barry E D.....	m ind rel	Universal Atlas	New York N Y
Bass F L.....	chem	Keystone	Bath Pa
Bassett L J.....	sup	Lehigh	Oglesby Ill
Bates J E.....	sales m	Federal	Buffalo N Y
Baumberger C.....	p	San Antonio	San Antonio Tex
Baumberger C jr....	vp		
Bayer L E.....	vp-s	National (Ala)	Birmingham Ala
Bayle F L.....	c eng	Glens Falls	Glens Falls N Y
Bayless O A.....	chem eng	Arkansas	Ada Okla
	chem	Oklahoma	
	p	Louisville Corp	
Baylor H D.....	vp-prod m	Louisville N Y	Speed Ind
		Louisville Co	
Bear Raymond R....	vp-gm	Lehigh	Allentown Pa
	vp	Great Lakes	
Beaton R M.....	sales m	Glens Falls	Glens Falls N Y
Bechtold R A.....	sup	Pennsylvania-Dixie	Valley Junction Ia
Beck A G.....	pl m	Canada	Montreal East Que Can
Beckett Garner A...	p	Riverside	Los Angeles Cal
Beddall J S.....	chem	Superior	406 S Sixth St Ironton O
Beeghly L A.....	p	Federal	City Bank Bldg Youngstown O
Belasco Martin F J..	traf m	Vulcanite	230 Park Av New York N Y
Bell G M.....	s-t-pa	Spokane	Spokane Wash
Bennett J C.....	act sup-pa	Marquette	Des Moines Ia
Berger E E.....	c chem	Kosmos	Kosmosdale Ky
Berns M A.....	pub m	Universal Atlas	New York N Y
Bethune J J.....	traf m	Alpha	Birmingham Ala
Beverstock Burt H...	p	Standard	810 Union Commerce Bldg Cleveland O
Bevier A T.....	sup	Great Lakes	Buffalo N Y
Bigler P G.....	as to vp of sales	Lone Star	New York N Y
Binford O J.....	gm	West Penn	Butler Pa
Binford R J.....	c eng	West Penn	West Winfield Pa
Bischoff Paul.....	chem	Aetna	Bay City Mich
Blackmore G C.....	chem	Northwestern States	Mason City Ia
Blair W R.....	sales m	Southwestern	El Paso Tex
Bliss W E.....	vp	Federal	City Bank Bldg Youngstown O
Blum Eugene.....	p-ch bd	Coplay	521 Fifth Av New York N Y
Bobbitt Bailey M...	t	Great Lakes	Buffalo N Y
Boberg P J.....	c chem	Lone Star (La)	New Orleans La
		Arkansas	
		Colorado	
	p	Gulf	
		Ideal	
Boettcher Charles...		Oklahoma	Denver Colo
		United States	
		Nebraska	
	p-t	Three Forks	
		Union	
		Arkansas	
	vp-t	Colorado	
		Ideal	
Boettcher C K.....		Oklahoma	Denver Colo
		Gulf	
	vp	Nebraska	
		Three Forks	
Boland Fred L	g sup	Petoskey	Petoskey Mich
Bollinger E F.....	chem	Pacific	Redwood City Cal
Bolster Marshall G..	vp	Aetna	50 Congress St Boston Mass
Bolster Stanley M...	s-t		
Bolton H B.....	sales m	Gulf	Houston Tex
Born Harry.....	c chem	Colorado	Boettcher Colo
Boucher L J.....	as sup	Universal Atlas	Northampton Pa
Bovard W Oliver...	sales eng	Canada	Montreal Que Can
Bowen John C.....	vp	Lehigh	Allentown Pa
Bowman C E.....	as s-t		
Boyer C R.....	traf m	Southwestern	Los Angeles Cal
Boyne E L.....	sup	Alpha	Jamesville N Y
Brader V P.....	pa	Keystone	Philadelphia Pa
Bradley C J.....	met sales m	Lone Star	New York N Y
Bragg J G.....	sales m	Alpha	Easton Pa
Bramlette F L.....	sales m	Longhorn	San Antonio Tex
Brandenburg H R...	chem	Cowell	Cowell Cal
Brandt R L.....	pa	Northwestern	Seattle Wash
Breerwood C H.....	vp	Allentown	Catasauqua Pa
Bresee M H.....	s	Cowell	San Francisco Cal
Bretherton T O.....	sales mgr	Allentown	1109 Packard Bldg Philadelphia Pa
Brewer H M.....	chem	Spokane	Irvin Wash
Bright R H.....	comp	Lehigh	Allentown Pa
Brobston Joseph....	ch bd	Hercules	Philadelphia Pa
Brodt George E....	pa	Nazareth	Nazareth Pa
Brooke C A.....	sales m	Monarch	Humboldt Kan
Brooks J P.....	sup	Superior Portland	Concrete Wash
Brooks Sanford.....	sales m	Arkansas	Little Rock Ark
Brotzman I C.....	as vp	Lone Star	New York N Y
Browder D S.....	traf m	Pennsylvania-Dixie	New York N Y
Brown A A.....	traf m	Lone Star (Kan)	Kansas City Mo
Brown A C.....	pl m	Kosmos	Kosmosdale Ky
Brown Arch.....	sup	Alpha	Cementon N Y
Brown G D.....	sup	Florida	Hooker's Pt Fla
Brown G S.....	ch bd	Alpha	Easton Pa
Brown Howard B...	s	Pittsburgh	1616 Walnut St Philadelphia Pa
Brown W L.....	s	Wolverine	Coldwater Mich
Browne H A.....	sup	Wyandotte	Wyandotte Mich
Brownlee C U.....	div sales m	Lone Star (Kan)	Kansas City Mo
Brownstead F C....	sup	Alpha	Ironton O
Bruff A C.....	vp-dist m	Edison	250 Stuart St Boston Mass
Brundage G W....	traf m	Bessemer	Youngstown O
Bryant J N.....	sup	Green Bag Pa	Pittsburgh Pa
Buchanan E M.....	chem	Superior Portland	Concrete Wash
Buckbee J C.....	vp	Petoskey	Petoskey Mich
Buckwalter R E.....	traf m	Lone Star (Va)	Norfolk Va
Bulman J T.....	dist sales m	Lone Star	918 Tower Bldg Washington D C
Burnett Coy.....	p-ch bd	Monolith	Los Angeles Cal
		Monolith Midwest	
Burnett W D.....	vp	Monolith	Los Angeles Cal
Burton H Ding.....	sales m	Ash Grove	Kansas City Mo
Butchart C M.....	p	British Columbia	Tod Inlet B C Canada
Butler C M.....	chem eng	Marquette	La Salle Ill
Cabanis J B.....	sales m	Northwestern States	Mason City Ia
Cabaniss W M.....	sup	Signal Mountain	Chattanooga Tenn
Caldwell L Hardwick.	vp		
Calkins J J.....	s-t	Monolith	Los Angeles Cal
Call A V.....	vp	California	Los Angeles Cal
Calloway E E.....	sup	Volunteer	Knoxville Tenn
Calvin Ben W.....	p-gm	Aetna	Bay City Mich

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.





B&W PULVERIZER TYPE E for Direct Firing Rotary Kilns

Equipped with automatic thermostatic control. A well-designed unit, notable for low maintenance, low power consumption and dependable, continuous operation.

C-40

THE BABCOCK & WILCOX COMPANY, 85 LIBERTY STREET, NEW YORK, N. Y.

BABCOCK & WILCOX

C-22

Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Cameron George T.	p	Santa Cruz	San Francisco Cal
Cameron W P.	ch Amer bd	Olympic	Seattle Wash
Campbell J W.	sup	North American	Catskill N Y
Canvin A H.	s-t	Pacific	San Francisco Cal
Capen Leo J.	sales m	Dewey	Davenport Ia
Card Ray.	c eng	Monarch	Humboldt Kan
Caress J E.	pa	Southwestern	El Paso Tex
Carlson E W.	as sup	Medusa	Dixon Ill
Carman C M.	sup	Universal Atlas	Independence Kan
Caron C E.	g sup	Trinity	Dallas Tex
Carstens F W.	pa	Manitowoc / Medusa	Cleveland O
Carter C G.	chem	Canada	Hull Que Can
Carter Robert C.	s-t	Glens Falls	Glens Falls N Y
Catterlin W B.	t	National (Ala)	Birmingham Ala
Chamberlain P R.	g sup	Dewey	Dewey Okla
Champion E C.	sup	Lone Star (Pa)	Nazareth Pa
Chandler W R.	c chem	Idaho	Inkom Ida
Chapman Matt J.	pa	Bessemer	Youngstown O
Charles Homer.	c eng	South Dakota	Rapid City S D
Cherry T A.	as g sup	Standard Lime	Millville W Va
Childs K S.	traf m	Superior Portland	Seattle Wash
Chubb J H.	m ser dep	Pennsylvania-Dixie	New York N Y
Clancy E M.	s	Kosmos	Louisville Ky
Clark O M.	sales m		
Cleary W H.	pro eng	Southwestern	Los Angeles Cal
Clem C A.	chem	Signal Mountain	Chattanooga Tenn
Clum W D.	traf m	Monarch	Humboldt Kan
Cochran B F.	sales m	Wabash	Detroit Mich
Coffman Herbert.	eng	Hercules	Philadelphia Pa
Colbeck S C.	as chem	Green Bag Pa	Pittsburgh Pa
Colburn D S.	vp	Marquette	Chicago Ill
Colburn N D.	div sup	Alpha	Easton Pa
Cole George W.	g traf m	Medusa	Cleveland O
Cole J S.	sup	Trinity	Box 152 Houston Tex
Collier James A.	sup	Louisville (N Y)	Brixment N Y
Collins Ben R.	s-t-pa	Longhorn	San Antonio Tex
Collins M M.	sup	Arkansas	Okay Ark
Colton J H.	vp	Pacific Portland	San Francisco Cal
Compton F H.	g sup	Allentown	Catasauqua Pa
Conn Charles F.	p	Giant	Philadelphia Pa
Conner Hugh.	chem	Trinity	Fort Worth Tex
Coogan F M.	vp	Alpha	Easton Pa
Cooley H S.	c chem	Washington-Idaho	Orofino Ida
Cooper D P.	vp	Lone Star (N Y)	Albany N Y
Cooper F W.	eng	Trinity	Box 4396 Stockyard Sta Fort Worth Tex
Couchman Albert R.	traf m	North American	285 Madison Ave New York N Y
Coulson D C.	c eng	Standard Lime	Box 885 Martinsburg W Va
Counts Oakley F.	comp	Ideal	Denver Colo
Couse W R.	as s-t	Yosemite	Merced Cal
Cowell I M.	vp-t	Cowell	San Francisco Cal
Cowell S H.	p		
Cowham R N.	vp	Trinity	Dallas Tex
Cox W R.	as t	Lone Star (Va)	Norfolk Va
Coy Dave S.	s	San Antonio	San Antonio Tex
Coyle G W.	traf m	National Portland	Philadelphia Pa
Craig B J.	s-as t	Ford	Dearborn Mich
Crapo W W.	s	Huron	Detroit Mich
Crawford T B.	act sales m	Georgia	Atlanta Ga
Crawford W O.	dist sales m	Edison	117 S 17th St Philadelphia Pa
Cressman J O.	sup	Whitehall	Cementon Pa
Creveling Louis.	c chem	Standard	Painesville O
Creveling W S.	c stat	Lone Star	New York N Y
Cribari S L.	as t	Marquette	Chicago Ill
Cronkrite A C.	vp	Universal Atlas	New York N Y
Cull Frank H.	traf m	Alpha	165 W Wacker Dr Chicago Ill
Currie H R.	s	Wabash	Detroit Mich
Currier F W.	t	Pittsburgh	Pittsburgh Pa
Curtis J E.	g sup	Consolidated / Florida / Signal Mountain / Trinity	Chicago Ill
Dalbey J H.	sales m	Cumberland	Cowan Tenn
Dalchow John.	sup	Wolverine	Coldwater Mich
Daniels R E.	s-as t	Federal	Buffalo N Y
Dannelly J M jr.	vp	National (Ala)	Birmingham Ala
Davidson H P.	traf mgr	Oregon	Portland Ore
Davis D A.	eng	Northwestern States	Mason City Ia
Davis E H.	p-t	Superior	150 Broad St Columbus O
Davis Gale.	chem	Green Bag Pa	Pittsburgh Pa
Davis Harry P.	g sup	Permanente	San Jose Cal
Davis Howell J.	vp	Volunteer	Knoxville Tenn
Davis P J.	as s	Whitehall	Philadelphia Pa
Davis William A.	vp	Standard	Painesville O
Davison Allen S.	p	Green Bag W Va	Kenova W Va
Davison George S.	ch bd-vp	Green Bag W Va	Pittsburgh Pa
Davy Wesley.	supt	Lehigh	New Castle Pa
Dawson Philip G.	vp-t	Manitowoc / Medusa	Cleveland O
Deadman W W.	sup	Lone Star (Va)	Norfolk Va
De Bruin N M.	sup	Lone Star (Ala)	Spocari Ala
De Jonckheere A P.	sup	Yosemite	Merced Cal
De Pont H B.	chem	Manitowoc	Manitowoc Wis
Devens Alex.	sup	Aetna	Bay City Mich
De Wolfe H.	eng	Medusa	Silica O
Dickinson W W.	vp	Marquette	Chicago Ill
Dieterman Henri.	eng	Aetna	Bay City Mich
Digman G E.	c eng	Green Bag (Pa)	Neville Island Pa
Dillon John R.	vp	Lone Star	New York N Y
Dilts I J.	sup	Colorado	Boettcher Colo
Dittmar R A.	sup	Universal Atlas	Hudson N Y
Dittmar W J.	pl m	Edison	Stewartsville N J
Dobbins Cris.	as sales m	Colorado	Denver Colo
Dodge Lee.	c chem	Lone Star (Va)	Norfolk Va
Donaghy G J.	s	Lone Star	New York N Y
Donaldson William.	as comp	Riverside	Los Angeles Cal
Donnaud Albert	div sales m	Georgia / Southern States	Atlanta
Doran Eugene S.	eng	Medusa	Dixon Ill
Dorland R R.	sup	Union	Devil's Slide U
Douglas Tom B.	s pa	Gulf	Houston Tex
Douglass A E.	p	Allentown / Valley Forge	Catasauqua Pa
Downs J Stanley.	sup	Hercules	Nazareth Pa
Dowrie J R.	sup	Canada	Montreal East Que Can
Dreisbach E E.	c chem	Standard Lime	Martinsburg W Va
Druckenmiller B W.	g sales m	Pennsylvania-Dixie	New York N Y
Drummy J R.	sales m	Volunteer	Knoxville Tenn
Duff C C.	as t	Lone Star (Tex)	Dallas Tex
Dufford E A.	sales m	Idaho	Inkom Ida
Duncan Stuart.	ch bd	Marquette	La Salle Ill
Dunn J C.	traf m	Peerless	Detroit Mich
Duque E E.	vp-gm	California	Los Angeles Cal
Durbin H R.	c chem	Lone Star	New York N Y
Durfee E R.	as s	Monolith	Los Angeles Cal
Duvall S L.	g sup	Superior	Portsmouth O
Easterby S D.	div sales m	Southern States	Columbia S C
Eckert H H.	vp-t	Edison	West Orange N J
Edison Charles.	p		
Edmonds C W.	sup	Canada	Fort White Man Can
Eichenlaub A C.	as wks m / c chem	Peerless	Detroit Mich
Eisele Milton.	traf m	Permanente	Oakland Cal
Eisenhard L A.	c chem	Lawrence	Siegfried Pa
Elcock W B.	vp-gm	Southern States	Rockmart Ga
Elliott G H.	vp	Whitehall	Philadelphia Pa
Enloe Eugene.	p	Idaho	713 Sprague Av Spokane Wash
Enloe Raymond.	s-t		
Ennis D A.	el eng	Glens Falls	Glens Falls N Y
Erdman C.	sup	Lone Star (Ind)	Limedale Ind
Erdman R O.	pa	Lehigh	Allentown Pa
Ernst E S.	chem	Dewey	Davenport Ia
Ernst Willam.	c chem	South Dakota	Rapid City S D
Erwin F C.	s	Edison	West Orange N J
Evans E Earl.	s-t	Volunteer	Knoxville Tenn
Evans J C.	c chem	Nazareth	Nazareth Pa
Fair William A.	s-t	Monarch	Hutchinson Kan
Fairchild J A.	c chem	Lone Star (Kan)	Bonner Springs Kan
Fairman J R.	as to vp	Pennsylvania-Dixie	New York N Y
Farmer H G.	tec ser dir	Universal Atlas	New York N Y
Fehnel S J.	as t	Nazareth	Nazareth Pa
Fellows R M.	as vp	Alpha	Chicago Ill
Ferguson L R.	vp	Lone Star (Tex)	Dallas Tex
Ferguson Paul.	pa	Missouri	St Louis Mo
Ferris G L.	traf m	Edison	West Orange N J
Fischer J P.	chem	Cumberland	Cowan Tenn
Fitzgerald.	traf clk	Lone Star (N Y)	Albany N Y
Flately A F.	as t	Lone Star (N Y)	
Fleming J E.	chem	Canada	Belleville Ont Can
Fleming M F.	sup	Colorado	Portland Colo
Flowers A E.	sup	Trinity	Fort Worth Tex
Fontane C E.	vp	Lone Star (Ala)	Birmingham Ala
Forbrich L R.	c chem	Bessemer	Bessemer Pa
Ford A E.	c chem	Green Bag W Va	Huntington W Va
Ford Edsel B.	p-t	Ford	Dearborn Mich

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fd field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superinterdent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.

"There's More WORTH in a Worthington!"

Rock Drills and Air Tools that use LESS AIR — Portable and Semi-Portable Compressors that deliver MORE AIR—that's the double-barreled, money-saving combination you get when you specify Worthington for your pit and quarry operations. Real Savings are yours because of the quality, workmanship, and outstanding features that put "More WORTH in a Worthington".

WJ-45
ROCK HAMMER

The champion of the middle-weight class—a 45 pound Rock Hammer that sets the pace in performance, ease of operation and appearance.

There is a Worthington Distributor or Branch Office in your area that will give you prompt local service.

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION, HARRISON, N. J.
HOLYOKE COMPRESSOR AND AIR TOOL DEPARTMENT
HOLYOKE, MASSACHUSETTS

RD1-2

Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Ford E L	vp	Huron	Detroit Mich
Ford J B	p		
Ford M	vp-t		
Foster A R	pa	California	Los Angeles Cal
Foules John I	dist sales m	Missouri	1600 Chelsea Av Memphis Tenn
Fowden William	pa-pl m	South Dakota	Rapid City S D
Fowler C B	chem	Medusa	Dixon Ill
Franks F B	vp-gm	National Portland	Bethlehem Pa
Franks J M	c eng	Alpha	Easton Pa
Frei Otto C	vp	Washington-Idaho	Orofino Ida
Fritts Stewart S	eng	Lone Star (Ala)	Birmingham Ala
Frost R B	as sup	Lone Star (Ind)	Limedale Ind
	sup	Lone Star (Ala)	Spocari Ala
Frudden E C	vp	Northwestern States	Dubuque Ia
Fuchs Karl	eng	Medusa	Bay Bridge O
Funch E E	as c eng	Lone Star	New York N Y
Funderburg L M	sup	Universal Atlas	Leeds Ala
Gallagher O J	t	Carrara	San Francisco Cal
Galster John L A	p-t	Petoskey	Petoskey Mich
Ganser J W	sup	Trinity	Eagle Ford Tex
Gardiner William T	ch bd	Pacific Coast	Boston, Mass
Gardner Frank	as sup	South Dakota	Rapid City S D
Gardner G O	sup	Ash Grove	Chanute Kan
Garrison M A	sup	Monolith	Monolith Cal
Gash Tom	ser eng	Lehigh	Atlanta Ga
Gaskill Palmer D	vp-t	Whitehall	Philadelphia Pa
Gasper D A	sup	Canada	Hull Que Can
Gath Carl W	s-t	Northwestern	Seattle Wash
Gay George R	vp-gm	Santa Cruz	San Francisco Cal
Genger C F	pa	Federal	Buffalo N Y
George A N	pa	Cowell	San Francisco Cal
Gerstell Robert S	s	Alpha	Easton Pa
Geyer N V	sup	Pennsylvania-Dixie	Kingsport Tenn
Gilchrist C	chem	Beaver	Gold Hill Ore
Giles T R	ser dir	Atlas Lumnite	New York N Y
Gillette W A	traf m	Monolith	Los Angeles Cal
		Monolith Midwest	
Gilson O B	vp	Union	Kiesel Bldg Ogden Utah
Gimson P K	chem	Alpha	La Salle Ill
Gish James A	sup	Lehigh	Easton Pa
Goethals A A	vp	Riverside	Los Angeles Cal
Gordon J T	div sales m	Lone Star (Pa)	New York N Y
Goss John H	vp	Nazareth	Nazareth Pa
Gould S G	dist sales m	Missouri	Kanas City Mo
Gray Walter	vp	Dewey	Kansas City Mo
Graybill Harvey	eng	Kosmos	Kosmosdale Ky
Green J H	pa	Consolidated	Chicago Ill
		Florida	
		Trinity	
Gretencort S A	sup	Three Forks	Hanover Mont
Grimes J E	sup	Hermitage	Nashville Tenn
Grimsley G R	as sup	Pittsburgh	East Fultonham O
Gring Claude E	pa	Riverside	Los Angeles Cal
Grunewald E	"Incor" div	Lone Star	New York N Y
Grunewald Max E	s-t-dir re	Coplay	24 N West St Allentown Pa
Gubernator E S	traf m	Lehigh	Allentown Pa
Guenther Felix jr	c eng	Pennsylvania-Dixie	1830 Wilson Av Bethlehem Pa
Gunderson Raym'd T	s	Trinity	Kenyon Minn
Guth E S	gm	North American	Hagerstown Md
Guth Evan B	c chem	National Portland	2243 Fairview Av Easton Pa
Guy F E	traf m	Universal Atlas	New York N Y
Hachtmann A P	eng	National Portland	806 Walnut St Allentown Pa
Haehnlen W L	vp	Giant	Philadelphia Pa
Haffner T N	sup	Keystone	Bath Pa
Hailey O L	c chem	Lone Star (Tex)	Dallas Tex
Haley A R	cement sales m	Pittsburgh	Pittsburgh Pa
Hall Glenn	sup	Wabash	Stroh Ind
Halstead O C	sup	Southwestern	Victorville Cal
Hamilton R L	pa	Alpha	Chicago Ill
Hampton E L	vp	Cumberland	Nashville Tenn
Hanahan J Ross	P	Volunteer	Charleston S C
Hanks Howard	c eng	Alpha	Easton Pa
Hanley D S	vp	Pacific Coast	Seattle Wash
Hanley V J	s-as t	Marquette	Chicago Ill
Hanly J B	sup	Canada	Eshaw Alta Can
Hanna W C	chem	California	Colton Cal
Hanson C A	pa-as s	Northwestern States	Mason City Ia
Harbaugh W M	c eng	Lehigh	Allentown Pa
Harchelroad E F	eng	Universal Atlas	Universal Pa
Hardy C E	sup	Pennsylvania-Dixie	Bath Pa
Harragin A C	comp	Lone Star	New York N Y
Harris A D	pa	Wyandotte	Wyandotte Mich
Harris C P	sup	Huron	Alpena Mich
Harris E A	pa	Aetna	Bay City Mich
Hart O C	chem	Monolith	Monolith Cal
Harte Thomas J	vp	North American	285 Madison Av New York N Y
Hartley E E	sales m	South Dakota	Rapid City S D
Hartsock R K	g sup	Louisville Co	Louisville Ky
		Louisville Corp	
Hartwell Warren	c chem	Vulcanite	Phillipsburg N J
Harwood A T	chem	Florida	2318 Bristol Ave Tampa Fla
Hasse O C	chem	Monarch	Humboldt Kan
Haubert Earl P	comp-pa	Lawrence	150 Broadway New York N Y
Hausman H R	asvp-asgm	Lehigh	Allentown Pa
Havard O D	g sup	Giant	Egypt Pa
Hayden J F	vp	Trinity	Dallas Tex
Haynes H A	pa	Pittsburgh	Barberton O
Heard Marion	chem	Calaveras	San Andreas Cal
Hearn C K	sales m	Superior	Portsmouth O
Heck W P	chem	Valley Forge	West Conshohocken Pa
Heffernan J J	as s	Universal Atlas	New York N Y
Heintzelman J H	c chem	Lone Star (Pa)	Nazareth Pa
Heleniak H M	vp-sales m	Spokane	Spokane Wash
Helwig H H	sup	Lehigh	Metaline Falls Wash
Henderson R R	mas mec	Yosemite	Merced Cal
Hendrickson E I	sup	California	Colton Cal
Henne E W	as tr	Missouri	St Louis Mo
Henry L G	t	Giant	Philadelphia Pa
Henshaw Griffith	vp	Riverside	200 Bush St San Francisco Cal
Henshaw Thomas D	s-t	Riverside	
Herbert F H	as s-t	Santa Cruz	San Francisco Cal
Herbert Thomas L jr	vp	Hermitage	Nashville Tenn
Herrod R F	pa	Pacific Portland	San Francisco Cal
Hicks T A	chem	Universal Atlas	New York N Y
Higgins B J	traf m	Glens Falls	Glens Falls N Y
Higgins W G	pa	Santa Cruze	San Francisco Cal
Hildebrand W	vp-gm	Edison	New York N Y
Hill E D	p-t	Louisville Co	Louisville Ky
	vp	Louisville N Y	
		Louisville Corp	
Hillman J H jr	p	Green Bag Pa	Pittsburgh Pa
Hines G J	as s	Cumberland	Cowan Tenn
Hinson H G	as s-as t	Bessemer	Youngstown O
Hjerpe A E	vp	Consolidated	Chicago Ill
Hoenig L J	sales m	Nebraska	Omaha Neb
Hoey M A	pa	Canada	Montreal Que Can
Hoffman R E	sup	Universal Atlas	Hannibal Mo
Hogan Charles L	p	Lone Star	New York N Y
Hogue F H	t	Kosmos	Louisville Ky
Hohle Joseph L	sup	Coplay	850 Third St Fullerton Pa
Hoke, Arnold	vp	Whitehall	Cementon Pa
Hollister C T W	p	Northwestern Portland	Seattle Wash
Holmes T K	vp	Calaveras	San Francisco Cal
Hooper J W	dist sales m	Lone Star	1010 Louderman Bldg St Louis Mo
Hooton A W	chem	Superior Portland	Concrete Wash
Horn George P	c chem	Longhorn	Longhorn Tex
Horan William T	traf m	Aetna	Bay City Mich
Horner A W	vp	Kosmos	Louisville Ky
Horner B R	eng	Medusa	Crescentdale Pa
Horner Charles	p-gm	Kosmos	Louisville Ky
Hornung J J	as t	Lehigh	111 W Washington St Chicago Ill
Hoskins J P	s-t	Signal Mountain	Chattanooga Tenn
Howe C F	c eng	Portland	Salt Lake City U
Hubbard H G	sup	Idaho	Inkom Ida
Huey R S	sup	Universal Atlas	Morgan Park Minn
Hughes P L	traf m	Diamond	Middle Branch O
Hummell R A	vp	Lone Star	New York N Y
Humphrey William A	ch bd	Pacific Portland	San Francisco Cal
Humphries A K	vp	Permanente	Wells Fargo Bldg San Francisco Cal
Hunt Fred B	pl m	Dewey	Davenport Ia
Hupmann William	pa	Southwestern	Osborn O
Hynes R B	pa	Universal Atlas	New York N Y
Ingley A H	s-t	Standard	Painesville O
Jackson Charles R	c chem	Arkansas	Denver Colo
Jackson E H	div sales m	Lone Star (Ala)	Birmingham Ala
Jaeger F L	sales m	Marquette	Chicago Ill
Jarrett G M	sup	Medusa	Silica O
Jennings H F	p-t	Wabash	Detroit Mich

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.

Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Jewett A S	div aud	Lone Star	New York N Y
John George W	vp	Petoskey	Petoskey Mich
John J B	ch bd p-gm	Medusa Manitowoc	Cleveland O
Johnson Carl D	ch com	South Dakota	Rapid City S D
Johnson Henry A	sup	Lehigh	Fordwick Va
Johnson J B	traf m	Consolidated Florida Signal Mountain Trinity	Chicago Ill
Johnson J D	P	Canada	Montreal Que Can
Johnson L B	sales m	Green Bag W Va	Kenova W Va
Johnson R P	pa	National Portland	Bethlehem Pa
Johnson W E	c chem	Universal Atlas	Independence Kan
Johnston L H	traf m	Pittsburgh	East Fultonham O
Johnston Norman	sup	St Mary's	St Mary's Ont Can
Johnston William J	c chem	Coplay	Coplay Pa
Jones C C	p-gm	Wolverine	Coldwater Mich
Jones L L	pa	Trinity	Fort Worth Tex
Jones R C	as-as t	Hermitage	Nashville Tenn
Jordan Guy	c chem	Southern States	Rockmart Ga
Jursits F J	as t	Lone Star (Kan)	Kansas City Mo
Kaiser Henry J	p	Permanente	Oakland Cal
Kaiser Henry J jr	s-proj m	Permanente	San Jose Cal
Kaiser W L	wks m	Peerless	Detroit Mich
Kaufman J F	sup	Arkansas	Okay Ark
Keeping W H	as s	Missouri	St Louis Mo
Keevil Earl S	c eng	Superior	Superior O
Keller W S	c chem	Trinity	Box 152 Houston Tex
Kelly G A	chem	Marquette	La Salle Ill
Kelso H B	pl eng	Trinity	Houston Tex
Kempster J H	sup	Universal Atlas	Buffington Ind
Kennedy A M	wks m	Green Bag Pa	Neville Island Pa
Kerby H E	g pa	Lone Star	New York N Y
Kickline H F	c chem	North American	Catskill N Y
Kiester H T	pa	Southwestern	Los Angeles Cal
Kilbourn F B	vp	Canada	Montreal Que Can
Kilgore A L	c chem	Lone Star (Ala)	Spocari Ala
Kilian George	s-t	Pennsylvania-Dixie	New York N Y
Killgore E S	dist sales m	Lone Star	Deposit Guaranty Bank Bldg Jackson Miss
Kinginger W W	vp	Diamond	Middle Branch O
Kinzie R A	c eng	Santa Cruz	San Francisco Cal
Kinzie R A jr	c chem	Santa Cruz	Davenport Cal
Kirk J A jr	traf m	Standard Lime	Baltimore Md
Kirkpatrick T W	as t	Green Bag Pa	Pittsburgh Pa
Kirp George L	as sup	Petoskey	Petoskey Mich
Kistler W W	chem	Nebraska	Superior Neb
Kittle L	as s-as t	Ash Grove	Kansas City Mo
Klein William H	vp-gm	Pennsylvania-Dixie	Nazareth Pa
Knappenberger H L	vp-gm	Oregon	Portland Ore
Knecht W N	traf m	Alpha	Easton Pa
Knickerbocker C J	chem	Consolidated	Fredonia Kan
Knickerbocker G C	chem	Wabash	Osborn O
Knode Ralph H	vp	Whitehall	Philadelphia Pa
Knott E E	as sales m	Lone Star (Tex)	Dallas Texas
Koch Charles E	chem	Medusa	York Pa
Koch D E	c chem	Giant	Egypt Pa
Kosh H C	vp	Lone Star	New York N Y
Koffman M A	s-t	Southwestern	Los Angeles Cal
Kohn Isidore	vp	Hercules	Philadelphia Pa
Krabbe A F	sup	Olympic	Bellingham Wash
Krabbe H M	eng		
Krabbe Ivan	eng	Monolith Midwest	Laramie Wyo
Kraft T W jr	eng	Kosmos	Kosmosdale Ky
Krebs A F	sup	Medusa	Crescentdale Pa
La Forge G S	sup	Lehigh	Union Bridge Md
Lambert W B	s	British Columbia	Victoria B C Can
Lane J O	s-t	Southern States	Rockmart Ga
Lang A G	sup eng	Pacific Portland	Redwood City Cal
Languth Frank	eng	Santa Cruz	Davenport Cal
Larkin H J	asvp-asgm	National Portland	Bethleham Pa
Larmour H McC	chem	Yosemite	Merced Cal
Larsen Orla	g sup	National Portland	Bethlehem Pa
Larsson A G	c chem-eng	St Mary's	St Mary's Ont Can
Lasher W L	sup	Green Bag W Va	Kenova W Va
Latimer B J	sup	Three Forks	Trident Mont
Laude C L	pa	Huron	Detroit Mich
Lawler L F	sales m	Peerless	Detroit Mich
Lawler J H	div sales m	Lone Star (N Y)	Albany N Y
Lawniczak G A	sup	Alpha	La Salle Ill
Leach Wallace	c chem	Louisville Co Louisvile Corp	Speed Ind
Leche D H	pa-g sup	Oregon	Portland Ore
Lee Clyde	c chem	Universal Atlas	Leeds Ala
Legate J H	sup	Canada	Belleville Ont Can
Legg A E	sup	Pennsylvania-Dixie	Richard City Tenn
Leh H H	gm	Keystone	Bath Pa
Lehaney J A	vp	Lone Star (Kan)	Kansas City Mo
Leichel Paul	sup	North American	Security Md
Leidy Philip	sec	National Portland	Philadelphia Pa
Leikhim J H	as t	Lone Star (Ind)	Indianapolis Ind
Leisenring Edward B	vp	Whitehall	Philadelphia Pa
Lemasters A V	t	Lone Star	New York N Y
Lennig J F	s	Giant	Philadelphia Pa
Lentz L F	p	Whitehall	Philadelphia Pa
Lentz W O	as to vp		
Leonard Howard E	c eng	Vulcanite	Easton Pa
Leonard Warren H	vp-gm	Riverside	Los Angeles Cal
Lesan C R	chem	Permanente	Mountain View Cal
Lewis Charles F	gm	Volunteer	Knoxville Tenn
Lewis George E	as t	Lone Star (Pa)	Nazareth Pa
Lewis John	p	Carrara	San Francisco Cal
Lind John G	vp-gm-pa	St Mary's	St Mary's Ont Can
Lindahl O N	com s	Universal Atlas	New York N Y
Lindsay G L	eng tes		
Linn H F	c chem	Trinity	Eagle Ford Tex
Lintz Mark	c eng	Calaveras	San Andreas Cal
Little A J	sup	Medusa	Bay Bridge O
Lober John C	s-as t	Vulcanite	Philadelphia Pa
Lockhart L	sup	Ford	Dearborn Mich
Loghry L I	c chem	Superior	Portsmouth O
Long C C	sec	Lehigh Great Lakes	Allentown Pa Buffalo N Y
Loring H C	eng	Alpha	Martin's Creek Pa
Lovejoy H P	New Eng sales m	Lone Star	10 High St Boston Mass
Loveland R A	chem	Dewey	Dewey Okla
Loveridge F R	sup	Alpha	Alpha Mo
Lucas A E	chem	Union	Devil's Slide U
Lucas Edwin P	p	Superior Portland	Seattle Wash
Lucas H H	vp-sales m	Petoskey	Petoskey Mich
Lucas H L	c chem	Colorado	Portland Colo
Luck C A	as to gm	Peerless	Detroit Mich
Lugnet Verner	chem eng	Oregon	Lime Ore
Lundeen C M	sup	Washington-Idaho	Orofino Ida
Lundteigen A	vp	Ash Grove	Kansas City Mo
Lundy C L	c chem	San Antonio	San Antonio Tex
Lynn John	chem	Lehigh	Ormrod Pa
Lyons F G	as s-t	Alpha	Easton Pa
MacBride Donald S	vp-salesm	Hercules	Philadelphia Pa
MacCarey C R	pa-traf m		
MacDonald B A	vp	Northwestern States	Mason City Ia
MacDonald Earle	vp	Riverside	Riverside Cal
MacFarland D H	vp	Medusa	Cleveland O
MacLaughlin G W	g pa	Edison	West Orange N J
MacNider Hanford	p	Northwestern States	Mason City Ia
Magee J F	vp	Alpha	Easton Pa
Maginn H C	sales m	Calaveras	San Francisco Cal
Maginnis Stuart P	vp-s-t	Keystone	Philadelphia Pa
Maher F M	sales m	Union	Salt Lake City U
Mahon R J	g traf m	Lone Star	New York N Y
Mallon John H	sales m	Louisville Co	Louisville Ky
Mandia J V	c chem	Marquette	Des Moines Ia
Marshall C Wilbur	div sales m	Lone Star (Va)	Norfolk Va
Marshall R M	vp	Green Bag Pa	Pittsburgh Pa
Marshall William H	pa	Glens Falls	Glens Falls N Y
Martin C W	sup	Beaver	Gold Hill Ore
Martin P E	vp	Ford	Dearborn Mich
Masters M	c chem	Superior Portland	Seattle Wash
Mather J W	s-atty	Missouri	St Louis Mo
Mathias E C	sales m	Standard Lime	Baltimore Md
Matthew J J	t	Alpha	Easton Pa
Matthes W L	pl m	Alpha	Manheim W Va
Matthews Guy B	chem	Marquette	Cape Girardeau Mo
Matthews M O	m vp	Arkansas Oklahoma Gulf	Ada Okla
Matthews R C	sup	Marquette	Cape Girardeau Mo
Mayhew L M	as sup	Nebraska	Superior Neb
Maytham W J	eng	Northwestern States	Mason City Ia
McAdam Francis A	tec re dir	Southern States	Rockmart Ga
McAllister R W	sup	Pittsburgh	East Fultomham O
McArdle C S	vp-sales m	Missouri	St Louis Mo
McCall Archie	as s	California	Los Angeles Cal
McCanless W A	m	Yosemite	Merced Cal
McCann F P	vp	Riverside	San Francisco Cal
McCarthy J A	p	Pacific Portland	San Francisco Cal
McCaslin FE	s-t	Oregon	Portland Ore

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.

MORE AND MORE CEMENT MILLS ARE ADOPTING FINER CRUSHING ON BOTH RAW AND CLINKER SIDES

Since it is more economical to crush down to 3/8 inch and even finer, than it is to grind a coarse mill feed, many cement mills in this country and overseas have found that when raw material and clinker are crushed in Symons Cone Crushers overall production costs are materially reduced. In addition to reducing costs, a finer mill feed increases mill capacity with the same power input. It is also possible to use smaller balls with more points of contact and more ball area available for grinding. Liner wear and grinding mill maintenance are also lessened. These and other advantages can be achieved through finer crushing with Symons Cones in the production of cement.

WRITE FOR THIS BOOKLET GIVING FURTHER PARTICULARS ON SYMONS CONE CRUSHERS AS APPLIED TO CEMENT MILL SERVICE

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

NEW YORK
60 East 42nd Street

LOS ANGELES
Subway Terminal Bldg.

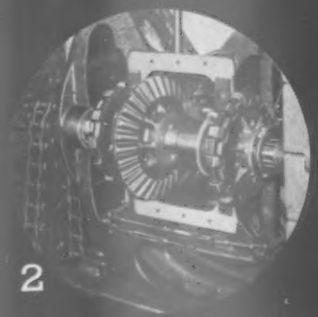
LONDON
Bush House

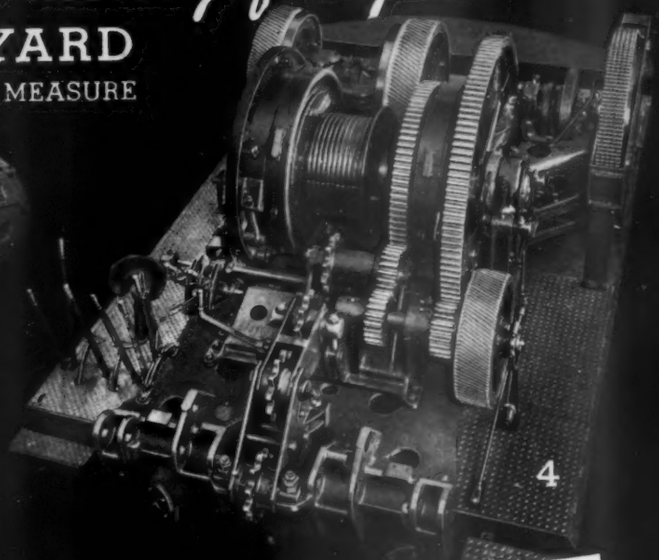
TORONTO
Concourse Bldg.

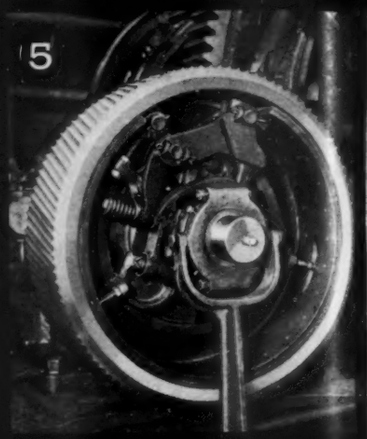
SYMONS CONE CRUSHERS

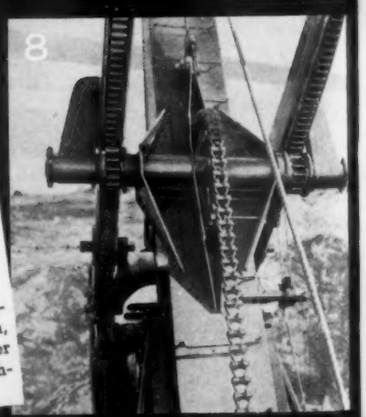
THESE 54-B FEATURES will make money for you

2½ YARD
STRUCK MEASURE









1 Roller path, with double flanges to take both up and down loads from hooked cone rollers, is combined with truck frame for compact strength . . . internal swing rack . . . big, square axles give high clearance. Cats that get you where you want to go in a hurry . . . self-cleaning, easy to adjust, offering powerful traction . . . "swamp-cats" available for dragline work.

2 Single-shaft propel, bevel gears enclosed in oil . . . chain drive . . . 4-position ratchet chocking dogs give free move-up without operator attention for either shovel or dragline.

3 Fast-digging dipper . . . long, sharp teeth, reversible and renewable . . . bowl smooth and tapered inside for quick dumping . . . bail does not obstruct top . . . curved door . . . extra-wide-spread handles with tubular torsion box.

4 Strong, simple main machinery . . . plenty of room to work in cab . . . variable diameter split drum laggings . . . roller-chain drive and bevel swing gears enclosed in oil . . . 207 h.p. diesel engine.

5 Revolutionary clutches . . . few parts, easy one-point adjustment that "stays put" . . . big cooling surfaces . . . inter-changeability of bands between swing clutches and between drum shaft clutches . . . operator has "feel" necessary for fast operation.

6 Six swing hook cone rollers give long range stability with less dead weight and eliminate center pintle . . . even load distribution . . . smooth, swift swing . . . no adjustments.

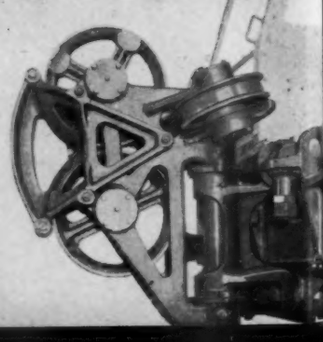
7 Easy operation . . . levers require exceptionally light pressure, give quick, accurate control . . . all operating levers easily accessible from seat . . . full vision of work at all times . . . comfortable, all-weather cab.

8 Single-chain crowd . . . one-point adjustment . . . easy removal for conversion to dragline . . . chain in center of boom, no side pull . . . powerful crowd-out and fast retract with dipper under full control at all times. Boom can be raised or lowered without affecting crowd chain adjustment.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Ships conveniently
without major dismantling

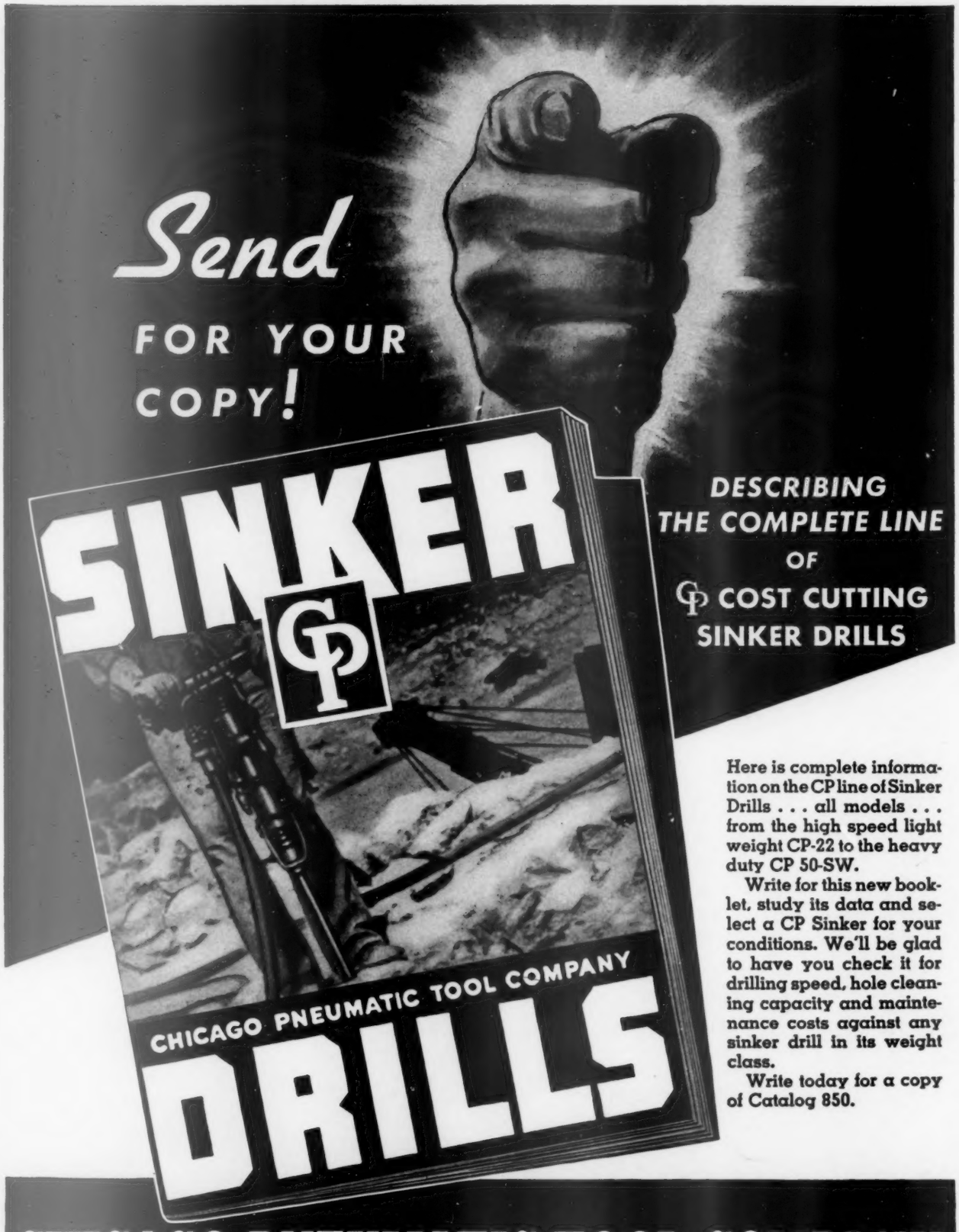


Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
McClarnan H C	sup	Alpha	La Salle Ill
McClenahen J M	sup	Oregon	Lime Ore
McConnell L G	vp	Lone Star (Pa)	New York N Y
McCormack A T	g sales m	Medusa	Cleveland O
McCracken J B	sales m	Keystone	Philadelphia Pa
McDonald L M	sup	Canada	Port Colborne Ont Can
McDonald Thomas	c eng	Louisville Co / Louisville N Y / Louisville Corp	Speed Ind
McFadden H C	as s-as t	Ash Grove	Kansas City Mo
McGinnis F S	vp	Southwestern	65 Market St San Francisco Cal
McGovern E W	sales m	Hermitage	Nashville Tenn
McIntosh J H	wks m	British Columbia	Bamberton B C Can
McKee F C	vp	West Penn	Butler Pa
McKee John D	vp	Pacific Portland	San Francisco Cal
McKelvy F G	p	Alpha	Easton Pa
McKelvy J D	as to vp	Alpha	New York N Y
McKinnon Fred W	c eng	Pittsburgh	East Fultonham O
McMillan James T	vp	Wabash	Detroit Mich
Meade V M	pa	Edison	Stewartsville N J
Medley R H	pa	Hermitage	Nashville Tenn
Meighan Dr M H	c chem	Whitehall	Allentown Pa
Mein William W	p	Calaveras	Redwood City Cal
Mein William W jr	pa	Calaveras	San Francisco Cal
Melton Frank	chem	Hermitage	Nashville Tenn
Merrill C C	vp gm	Southwestern	Los Angeles Cal
Mertens G W	vp	Pacific Coast	Seattle Wash
Meyers D T	traf m	Huron	Detroit Mich
Meyers S L	c chem	Southwestern	El Paso Tex
Michael C F	as s	Nazareth	Nazareth Pa
Miller A F	con eng	Marquette	La Salle Ill
Miller A J	sales m	Green Bag Pa	Pittsburgh Pa
Miller C G	chem	Medusa	Bay Bridge O
Miller E K	aud	North American	Albany N Y
Miller Howard	s-t / t	Consolidated / Florida / Trinity	Chicago Ill
Miller John A	p	Pennsylvania-Dixie	New York N Y
Mills M E	as t	Peerless	Detroit Mich
Miner J L	vp	Atlas-Lumnite	New York N Y
Mitchell C P	sup	Monarch	Humboldt Kan
Mitchell E B	dist m	Lone Star (Tex)	Houston Tex
Mitchell R B	sales m- / traf m	Cowell	San Francisco Cal
Moeller William	g sup	Lone Star (Tex)	Dallas Tex
Monday M C	p	Cumberland / Hermitage	Box 465 Knoxville Tenn
Montz W J	sup	Lehigh	Ormrod Pa
Mooney Philip	fld eng	Medusa	Cleveland O
Moore Charles J	c chem	Lone Star (Ind)	Limedale Ind
Moore F S	traf m	Whitehall	Philadelphia Pa
Moore H H	as t	Superior	Portsmouth O
Moore N D	p	Pacific Coast	Seattle Wash
Moore O L	dir tes	Universal Atlas	New York N Y
Moore Raymond W	vp s	Dewey	Kansas City Mo
Moran M F	traf m	Lone Star (Ind)	Indianapolis Ind
Morgan D C	sup	Allentown	Evansville Pa
Morgan Dwight	vp	Lone Star (Va)	Norfolk Va
Moritz Raymond A	sup	Lehigh	Fogelsville Pa
Morrow C B	chem	Medusa	Crescentdale Pa
Moyer Albert	p	Vulcanite	230 Park Av New York N Y
Moyle Frank	sup	Marquette	La Salle Ill
Moyle R sr	vp		
Muirhead W H	vp	Beaver	Gold Hill Ore
Murgittroyd W H	vp	Idaho	713 Sprague Av Spokane Wash
Murphy C J	chem	Canada	Fort White Man Can
Murphy D J	vp-s-t	Santa Cruz	San Francisco Cal
Murray W F	vp-pa- / g sup	Wolverine	Coldwater Mich
Nagle William	traf m	Coplay	Coplay Pa
Narsted J	c eng	Canada	Montreal Que Can
Neill F D	sup	Spokane	Irvin Wash
Neil R F	p-gm	Spokane	Spokane Wash
Nelson Buell C	s	Beaver	Portland Ore
Nelson J L	vp-sales m	Wolverine	Coldwater Mich
Nelson N H	sup	Superior Portland	Seattle Wash
Nelson Ole	pa	Superior Portland	Concrete Wash
Newhard E P	sup	Pennsylvania-Dixie	Clinchfield Ga
Newhard George E	sup	Valley Forge	Conshohocken Pa
Newlands L C	p	Oregon	Portland Ore
Neylan J F	g sales m	Lone Star	New York N Y
Nichols C D	vp	Oklahoma	1018 Perring Bldg Oklahoma City Okla
Nichols Henry D	vp	Riverside	200 Bush St San Francisco Cal
Nicholson George A.	p	Georgia National	Birmingham Ala
Noble Charles H jr	t	Hercules	Philadelphia Pa
Nodell L C	chem	Wolverine	Coldwater Mich
Nork J A	pa	Allentown / Valley Forge	Catasauqua Pa
North Harry E	traf m	Southwestern	El Paso Tex
Norton William	eng	Medusa	York Pa
Norvig Johan	g sup	Pennsylvania-Dixie	Nazareth Pa
Nugent W S	sales dir	Consolidated	Jackson Mich
Nulty C A	sales m	Ash Grove	Omaha Neb
Nunn Arthur	sup	Consolidated	Fredonia Kan
Nyman E O	s-pa	Petoskey	Petoskey Mich
O'Callaghan J	sup	Lone Star (Kan)	Bonner Springs Kan
O'Connor T E	t	Universal Atlas	New York N Y
Odenkirk E B	as t	Medusa	Cleveland O
Oesterle A A	sup	Federal	Buffalo N Y
Oldham J Bryan	div sales m	Lone Star (Texas)	Dallas Tex
Olsen G J	sup	California	Colton Cal
Olver M D	chem	Allentown / Valley Forge	West Conshohocken Pa
Park M R	off m	Georgia	Atlanta Ga
Parker G S	sup	Dewey	Davenport Ia
Parks Charles R	t	North American	Albany N Y
Parsons L A	re eng	Calaveras	San Andreas Cal
Partridge T K	sales m	Southwestern	Los Angeles Cal
Pearson Frank	s-t	Cumberland	Cowan Tenn
Pearson J C	dir re	Lehigh	Allentown Pa
Pearson W L	g pa	Pennsylvania-Dixie	Nazareth Pa
Pelly B B	s	Olympic	Seattle Wash
Pennicuik N	as comp	Lone Star	New York N Y
Perine R R	as t	Lone Star (La)	New Orleans La
Peters C N	off m	Lone Star	New York N Y
Peters S N	vp	Giant	Philadelphia Pa
Petersen W G E	eng	Universal Atlas	Hudson N Y
Peterson N H	c eng	Superior Portland	Concrete Wash
Phelan James T	sup	Glens Falls	Glens Falls N Y
Phillips B D	p	West Penn	Butler Pa
Phillips Carl	chem	Petoskey	Petoskey Mich
Phillips C E	sup	Missouri	Prospect Hill Mo
Phillips G B	sup	Standard Lime	Martinsburgh W Va
Pickens C H	chem	Pennsylvania-Dixie	Kingsport Tenn
Pickford Fredric	as s / s	Medusa / Manitowoc	Cleveland O
Pierson George E	vp	Lone Star (Ind)	Indianapolis Ind
Pittingell R E	chem	Canada	Port Colborne Ont Can
Poore George P jr	sup	Calaveras	San Andreas Cal
Porter John J	p	North American	285 Madison Av New York N Y
Posselt E	vp	Lone Star	New York N Y
Powell F H	p	Southwestern	Los Angeles Cal
Price Carl M	chem	Permanente	San Jose Cal
Priest R W	sales m	Yosemite	San Francisco Cal
Pritchard L R	c chem	Lone Star (N Y)	Hudson N Y
Puckett C L	pa	Colorado / Ideal / Nebraska / Three Forks / Union	Denver Colo
Raber Charles T	chem	Glens Falls	Glens Falls N Y
Rader B H	vp	Lehigh	111 W Washington St Chicago Ill
Raff Ray M	s-t	Diamond	Middle Branch O
Raff R D	p-gm		
Rahn G J	eng	Marquette	La Salle Ill
Ramage W L	as t	Edison	West Orange N J
Rawlings Stuart L	vp	Calaveras	San Francisco Cal
Ray J M	chem	Pittsburgh	East Fultonham O
Reed Harry E	g sup	Bessemer	Youngstown O
Reichenbach H A	g sup	Nazareth	Nazareth Pa
Reid A J	s-t	St Mary's	Toronto Ont Can
Reid H P	eng	Universal Atlas	New York N Y
Reiter George H	vp		
Reitze Chester N	vp-gm	Superior Portland	Seattle Wash
Reninger H A	dir saf & wel	Lehigh	Allentown
Reuter J A	vp	Northwestern Portland	The Dalles Ore
Rhodes Fred H	p-gm	Monarch	Humboldt Kan
Rhodes G W	c chem	Pennsylvania-Dixie	Clinchfield Ga
Rhodes S H	sup	North American	Howe's Cave N Y

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.



Here is complete information on the CP line of Sinker Drills . . . all models . . . from the high speed light weight CP-22 to the heavy duty CP 50-SW.

Write for this new booklet, study its data and select a CP Sinker for your conditions. We'll be glad to have you check it for drilling speed, hole cleaning capacity and maintenance costs against any sinker drill in its weight class.

Write today for a copy of Catalog 850.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.

SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD

Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, pages 86 and 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Richards Floyd	chem	Northwestern Portland	Grotto Wash
Richardson George M	t	National Portland	Philadelphia Pa
Richardson W M	p		
Rinehart C R	c chem	Diamond	Middle Branch O
Riordan Joseph	sup	Santa Cruz	Davenport Cal
Ritter J R	chem	Beaver	Gold Hill Ore
Roadstrum Victor N	ch bd	Pennsylvania-Dixie	Llewellyn Park West Orange N J
Roberts C M	traf m	Volunteer	Knoxville Tenn
Robeson H B	p-gm	Nazareth	Nazareth Pa
Robison S J	c eng	Universal Atlas	New York N Y
Robusky John	pa	Coplay	Coplay Pa
Robyn W G	traf m	Hermitage	Nashville Tenn
Rodarmel Claude	sup	Oklahoma	Ada Okla
Rogers Alfred	p	St Mary's	Toronto Ont Can
Rogers E S jr	as sales m	Medusa	Cleveland O
Rogers L W	dir of sales	Consolidated	Fredonia Kan
Rohwer O H D	vp	Universal Atlas	New York N Y
Ronk Frank	chem	Olympic	Bellingham Wash
Rooney A J	vp-sales m	Huron	Detroit Mich
	sales m	Wyandotte	
Root F E	t	Wolverine	Coldwater Mich
Roscoe R D	vp	Bessemer	Youngstown O
Rowan Joseph H	pa	Permanente	San Jose Cal
Rumfelt Claude	as sup	Wolverine	Quincy Mich
Rusk W H	as sup	Diamond	Mansfield O
Russell G A	s-t	Canada	Montreal Que Can
Russell S W	sales m	Monolith Midwest	2139 Blake St Denver Colo
Russell W B	ch eng	Peerless	Detroit Mich
Russell W C	vp-gm		
Sabin W P	vp-t	Ash Grove	Kansas City Mo
Sadd W A	ch bd	Signal Mountain	Chattanooga Tenn
Saeger Geoff A	ch chem	Gulf	Houston Tex
Savoie H E	g sales m	National (Canada)	Montreal Que Can
Sawyer H A	vp	Lone Star (La)	New Orleans La
Saxby L W	as to p	Marquette	Chicago Ill
Sayre H W	sales m	California	Los Angeles Cal
Schaeffer J Allen	c chem	Hercules	Nazareth Pa
Schatzlein K J	as s-t	Lehigh	Allentown Pa
Scherr Harry	vp-s	Green Bag W Va	Kenova W Va
Schrecongost C P	traf m	Green Bag Pa	Neville Island Pa
Schultz F R	traf m	Federal	Buffalo N Y
Schultz William	pa	Superior Portland	Seattle Wash
Schulzke O F	g sup	Missouri	Kansas City Mo
Schwaab George P	sales m	Manitowoc	Manitowoc Wis
Scot P Turner	sales m	Georgia	Atlanta Ga
Scott E A	dist sales m	Edison	444 Madison Av New York N Y
Scott Harold M	p	Keystone	Philadelphia Pa
Searles P S	traf m	Lone Star (Pa)	Nazareth Pa
Sebaugh J H	div pa	Pittsburgh	Zanesville O
Selfe Frank	c eng	Consolidated	Cement City Mich
Selinger F J jr	as g sales m	Pennsylvania-Dixie	New York N Y
Senior John L	p	Consolidated Florida Signal Mountain Trinity	Chicago, Ill.
Sepic M M	s-t	Peerless	Detroit Mich
Shaddix J E	chem	National (Ala)	Ragland Ala
Shaw C P	traf m	Superior	Portsmouth O
Shaw V E	pa	Louisville Co Louisville (N Y)	Louisville Ky
Shea Charles A	t	Permanente	Oakland Cal
Shelby Arthur B	vp-gm	Calaveras	San Francisco Cal
Sheppard Edgar F	s-t	Lawrence	150 Broadway New York N Y
Sherwood Clyde C	s	Carrara	San Francisco Cal
Shipley H R	sup	Oregon	Oswego Ore
Shipley L E	chem	Canada	Montreal East Que Can
Short George N	sales m	Three Forks	Butte Mont
Shumberger John C jr	val eng	Lehigh	Allentown Pa
Sieler Julius	s-t	South Dakota	Rapid City S D
Silcox M L	c chem	Pennsylvania-Dixie	Valley Junction Ia
Simmon D B jr	g sup	Southern States	Re:kmart Ga
Simons E J	p-gm	Washington-Idaho	Spokane Wash
Simons E J jr	vp		
Sims N M	pa	Great Lakes	Buffalo N Y
Sincell J E	pa	Green Bag Pa	Pittsburgh Pa
Singleton J Ed	vp	Glens Falls	Glens Falls N Y
Sippey W B	as sales m	Pittsburgh	East Fultonham O
Sisson I F	sales m	Signal Mountain	Chattanooga Tenn
Slocum R L	sup	Universal Atlas	Universal Pa
Sly Homer	vp	Petoskey	Petoskey Mich
Smith A F	vp	Monolith Monolith Midwest	Los Angeles Cal
Smith Arthur G	c eng	Northwestern Portland	Seattle Wash
Smith Blaine S	p	Universal Atlas	New York N Y
Smith C E	sup	National (Canada)	Montreal East Que Can
Smith Earl R	s-t	Washington-Idaho	Spokane Wash
Smith E B	eng	Dewey	Davenport Ia
Smith F E	g sup	Northwestern States	Mason City Ia
Smith George	sup	Northwestern States	Gilmore City Ia
Smith J B	t	Calaveras	San Francisco Cal
Smith L E	sup	Medusa	Dixon Ill
Smith Warren F	dist sales m	Lone Star	228 N La Salle St Chicago Ill
Smith W Marshall	chem	Huron	Alpena Mich
Snell Don	chem	Consolidated	Cement City Mich
Snow Ann D	vp	Portland	Salt Lake City U
Snow Ashby	p		
Snow E P	sup		
Snow Herbert A	s-t		
Snow Vivian	pa		
Snyder H N	vp-t	Federal	Buffalo N Y
Soldini R B	sales m	Monolith	Los Angeles Cal
Sparks H S	sup	Southwestern	El Paso Tex
Speed Harry C jr	dist sales m	Lone Star	225 S 15th St Philadelphia Pa
Speed William S	ch bd	Louisville Co	Louisville Ky
Spencer E G	as sup	Longhorn	Longhorn Tex
Spring M J	div sales m	Lone Star (Ind)	Indianapolis Ind
Stancliff A D	g sup	Lone Star (La)	New Orleans La
Stanger A E	sales m	Whitehall	Philadelphia Pa
Stark A O	vp	Universal Atlas	New York N Y
Starke Howard	sup	Riverside	Crestmore Cal
Statter Brockwell	p-gm	Beaver	Portland Ore
Stead J W	pa	Peerless	Detroit Mich
Steese R C	ch bd	Bessemer	Youngstown O
Steiner Herbert E	vp	Coplay	521 Fifth Av New York N Y
Stewart Stanley G	vp	Consolidated	Chicago Ill
Stiffler E E	chem	Medusa	Silica O
Stone F L	vp	Universal Atlas	New York N Y
Storey Smith W	p	Consolidated Florida	Chicago Ill
	vp	Signal Mountain Trinity	
Strange E W	as t	Lone Star (Ala)	Birmingham Ala
Struckman Carl	eng	California	Colton Cal
Struckman Helger	as sup	Lone Star (La)	New Orleans La
Stugard Frederick R.	pl m	Hermitage	Nashville Tenn
Stutz C H	traf m	National (Ala)	Birmingham Ala
Sulfridge John	sup	Peerless	Detroit Mich
Sunderland A B	s-as t	Ash Grove	Kansas City Mo
Sunderland L T	p		
Sutton Floyd	sup	Pacific Portland	San Juan Bautista Cal
Sutton John G	vp	Pacific Portland	San Francisco Cal
Swayze M A	dir re	Lone Star	Hudson N Y
Sweeney Frank A	vp-sales m	Edison	New York N Y
Swegman W J	g sup	Wabash	Osborn O
Swett B L	vp east	Lehigh	Allentown Pa
	sales m		
Swiggert C A	supt	Lehigh	Iola Kan
Tallerday Howard G	vp	Yosemite	San Francisco Cal
Tasto William	sup	San Antonio	Cementville Tex
Taylor Charles B	sup	Louisville N Y	Brixment N Y
Taylor Robert L	sales m	Diamond	Middle Branch O
Tedesco J	s	Calaveras	San Francisco Cal
Thomas F C	g sup	Standard Lime	Martinsburg W Va
Thomas L B	sales m	Aetna	Bay City Mich
Thomas W H	pa	National (Ala)	Ragland Ala
Thompson Dewey	m "Incor" sales dir pub	Lone Star	New York N Y
Thompson J G	chem	Lawrence	Thomaston Me
Thompson P A	sales m	Oklahoma	Oklahoma City Okla
Thornton W M	vp	Longhorn	San Antonio Tex
Thune Erik	vp	National Portland	Philadelphia Pa
Tiedemann F G	pa	Kosmos	Kosmosdale Ky
Tilley W H	c chem	Lone Star (Tex)	Houston Tex
Tillotson Harold	c eng	Petoskey	Petoskey Mich
Titsworth H H	p	Glens Falls	420 Lexington Av New York N Y
Titus Glenn	c chem	Green Bag Pa	Neville Island Pa
Todd George P	vp	Vulcanite	Philadelphia Pa
Tomlin Edwin	m dir-t-pa	British Columbia	Victoria B C Can
Tomlinson G G	traf m	Lone Star (Tex)	Dallas Tex
Tongue Gordon P	t-s-sales m	Superior Portland	Seattle Wash
Town F E	sup	Manitowoc	Manitowoc Wis
Townsend Paul H	gm	Huron	Detroit Mich
Trainer L M	traf m	San Antonio	San Antonio Tex
Traynor F M	vp	Florida	Chicago Ill

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.

Officers, Superintendents, Engineers, Chemists and Other Executives of Portland-Cement Manufacturing Companies in the United States and Canada

(See company list, below and page 88, for full company names and complete local addresses.)

Name	Title*	Company	Address
Treat G G	p	Bessemer	Youngstown O
Trefethen E E jr	vp	Permanente	Oakland Cal
Treshow M	g sup	Monolith Monolith Midwest	Los Angeles Cal
Tretten O C	sales m	Santa Cruz	San Francisco Cal
Turk A	c eng	Diamond	Middle Branch O
Tuttle C M	traf m	Marquette	Chicago Ill
Twamley J F	vp-sales m	Coplay	New York N Y
Tyler D M	vp-m	Dewey	Dewey Okla
Tyler Frank E	p-gm	Dewey	Kansas City Mo
Tyler Waldo E	vp	Dewey	
Tyree A M	s-pa	North American	Baltimore Md
Uhle D J	vp	Coplay	Allentown Pa
Uhlig R G	vp-op m	Missouri	St Louis Mo
Underhill H O	sup	Alpha	Birmingham Ala
Uptegrove J H	traf m	Louisville Co Louisville N Y	Louisville Ky
Uren C H	pa	Yosemite	Merced Cal
Vanderwerp H L	vp	Manitowoc Medusa	Cleveland O
Van Deventer James	vp	Southern States	Knoxville Tenn
Van Slyke A H	s	Yosemite	San Francisco Cal
Van Zandt Paul C	vp	Universal Atlas	New York N Y
Velzey J E	sup	Southwestern	Osborn O
Vosburgh George	c eng	Aetna	Bay City Mich
Vroman L H	pa	Marquette	Chicago Ill
Walker B H	traf m	Lone Star (Ala)	Birmingham Ala
Wallace G L	traf m	Northwestern States	Mason City Ia
Wallerstedt C A	sup	Universal Atlas	Waco Tex
Walsh Arthur	vp	Edison	West Orange N J
Walter Boyd H	chem	Lehigh	Mason City Ia
Walter Floyd	sup	Pennsylvania-Dixie	Nazareth Pa
Warner H O	vp-sales m	Colorado	Denver Colo
Warner M J	ch bd	Nazareth	Nazareth Pa
Warner M Pierpont	as to p		
Warren Frank B	vp-sales m	Bessemer	Youngstown O
Warren G E	vp	Southwestern	Osborn O
Watkins H M	s-t	Pacific Coast	Seattle Wash
Watkins J E	eng	San Antonio	San Antonio Tex
Watling John W	vp	Wabash	Detroit Mich
Watson B G	as comp	Riverside	Los Angeles Cal
Watt A G	ser m	Lehigh	Allentown Pa
Weatherly H M	pa	Volunteer	Knoxville Tenn
Wechter Eugene J	re chem	Louisville Co	Louisville Ky
Wecker W A	p-t	Marquette	Chicago Ill
Weibel F A	s-t	Allentown Valley Forge	Catasauqua Pa
Weisheyer Jacob	vp-t	Missouri	St Louis Mo
Weitnecht W W	sup	Lehigh	Mitchell Ind
Werner Floyd	sup	Pennsylvania-Dixie	Portland Point N Y
Wescoe C H	as s-t	Lehigh	Allentown Pa
Wesson L	op m	Universal Atlas	New York N Y
West Charles C	vp	Manitowoc Medusa Monolith	Manitowoc Wis
West C T	pa	Monolith Midwest	Los Angeles Cal
West J G	div sales m	Lone Star (Louisiana)	New Orleans La
Wetzel H T	pa	Alpha	Easton Pa
Wheeler J P	as s-as t	Lone Star	New York N Y
Wheeler L J	sup	Lone Star (Tex)	Houston Tex
Wherrett H S	p	Pittsburgh	Pittsburgh Pa
White Ben T	p	Southern States	Cadiz Ky
White J L	sup	Alpha	Martin's Creek Pa
Whiting H M	s	Nazareth	Nazareth Pa
Whitlatch E E	sup	Medusa	York Pa
Whitney Roland	s s-t as s	Louisville Co Louisville N Y Louisville Corp	Louisville Ky
Wibel A M	pa	Ford	Dearborn Mich
Wiese G F	sup	Longhorn	San Antonio Tex
Wight H F	dist m	Edison	New York N Y
Wilder C A	s-t	West Penn	Butler Pa
Williams C S	ch bd	Edison	West Orange N J
Williams D R	c chem	Monolith	Laramie Wyo
Williams H A	c chem	Lone Star (Ala)	Birmingham Ala
Williams L B	sup	Cumberland	Cowan Tenn
Willson R M	c chem	Southwestern	Victorville Cal
Wilsnack George	c chem	Edison	New Village N J
Wilson Emerson J	atty	Carrara	Reno Nev
Wilson J D	chem	Trinity	Box 152 Houston Tex
Wing Walter S	vp	Pennsylvania-Dixie	New York N Y
Winsch M W	sup	Universal Atlas	Northampton Pa
Wishon A Emory	p	Yosemite	San Francisco Cal
Witt J C	tec ser m	Marquette	Chicago Ill
Wittenberg G J	sup	Consolidated	Cement City Mich
Woessner J F	comp-t-as s	Green Bag Pa	Pittsburgh Pa
Wolf Morris	s	Hercules	Philadelphia Pa
Wood A T	t-gm	Green Bag W Va	Kenova W Va
Wood Warren	c chem	Portland	Salt Lake City U
Woods Hubert	c chem	Riverside	Crestmore Cal
Wortham Gus S	p	Longhorn	Houston Tex
Worthy W J	g sup	Medusa	Cleveland O
Wulf Walter H	vp	Monarch	Humboldt Kan
Wyman C E	as s	Medusa	Cleveland O
Yike D W	chem	Volunteer	Knoxville Tenn
Yike J S	c chem	Great Lakes	Buffalo N Y
Young John	dir ind rel	Lehigh	Allentown Pa
Young Joseph S	p vp	Lehigh Great Lakes	Allentown Pa
Young R A	sales m	Northwestern Portland	Seattle Wash
Young Roy N	chem eng	Lehigh	Allentown Pa
Zook J B	el eng	Great Lakes	Buffalo N Y
Zull H R	sup	Wolverine	Coldwater Mich

*act acting, as assistant, atty attorney, aud auditor, bd board, c chief, ch chairman, chem chemist, clk clerk, com committee, comp comptroller, con consulting, dep department, dir director, dist district, div division, el electrical, eng engineer, fld field, g general, gm general manager, ind rel industrial relations, m manager or managing, mas mec master mechanic, met metropolitan, off office, op operating, p president, pa purchasing agent, pl plant, pro production, proj project, pub publicity, re research, s secretary, saf safety, ser service, stat statistician, sup superintendent, t treasurer, tec technical, tes tests, traf traffic, val valuation, vp vice-president, wel welfare, wks works.

Directory of Portland-Cement Companies in the United States and Canada

Aetna Portland Cement Co.
Bay City, Mich.

Allentown Portland Cement Co.
Fuller Bldg.
Catasauqua, Pa.

Alpha Portland Cement Co.
15 S. Third St.
Easton, Pa.

Arkansas Portland Cement Co.
Denver National Bldg.
Denver, Colo.

Ash Grove Lime & Portland Cement Co.
Fairfax Bldg.
Kansas City, Mo.

Beaver Portland Cement Co.
602 Lumbermen's Bldg.
Portland, Ore.

Bessemer Limestone & Cement Co.
1100 City Bank Bldg.
Youngstown, O.

British Columbia Cement Co., Ltd.
Belmont House
Victoria, B. C., Can.

Calaveras Cement Co.
315 Montgomery St.
San Francisco, Cal.

California Portland Cement Co.
601 W. Fifth St.
Los Angeles, Cal.

Canada Cement Co., Ltd.
Canada Cement Bldg.
Montreal, Que., Can.

Carrara Portland Cement Co., Inc.
Carrara, P. O. Beatty, Nev.

Colorado Portland Cement Co.
Denver National Bldg.
Denver, Colo.

Consolidated Cement Corp.
111 W. Monroe St.
Chicago, Ill.

Coplay Cement Mfg. Co.
Coplay, Pa.

Cowell Portland Cement Co.
2 Market St.
San Francisco, Cal.

Cumberland Portland Cement Co.
Cowan, Tenn.

Dewey Portland Cement Co.
101 W. Eleventh St.
Kansas City, Mo.

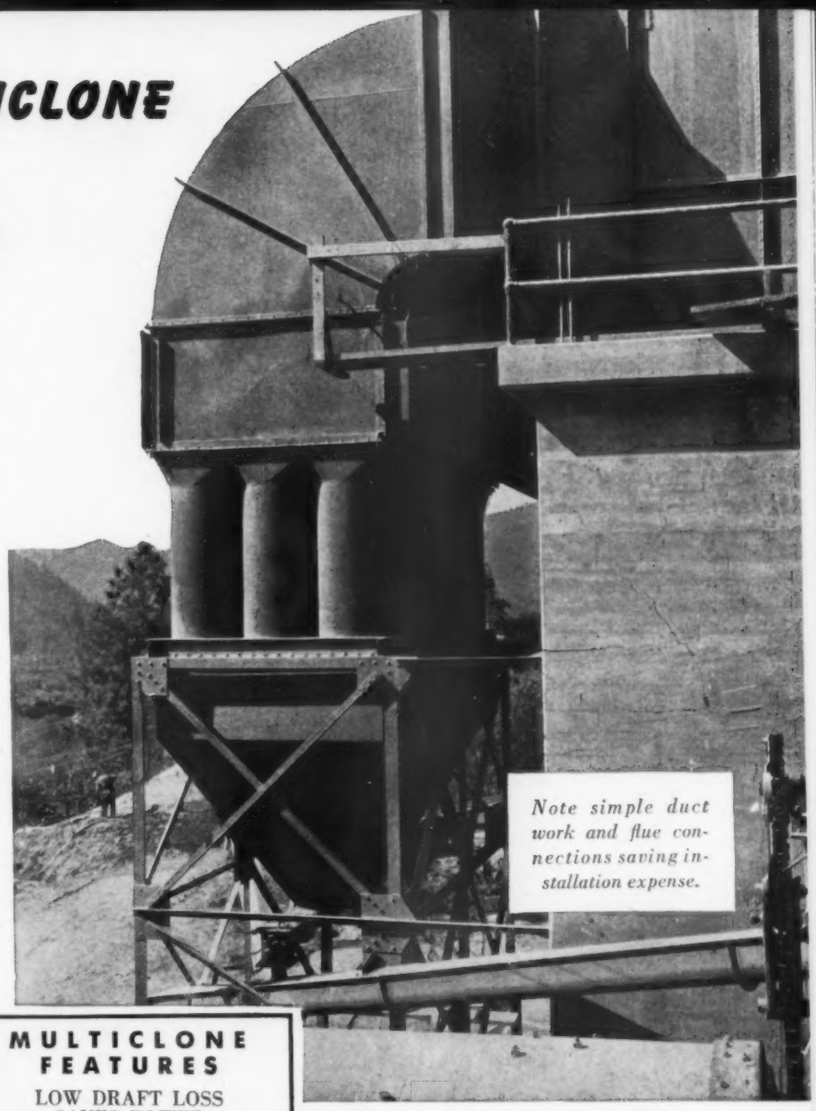
Diamond Portland Cement Co.
Middle Branch, O.

Edison Cement Corp.
444 Madison Ave.
New York, N. Y.

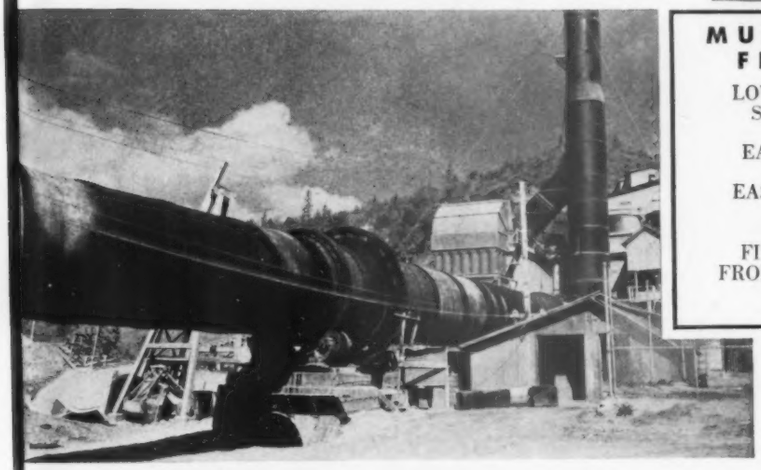
Federal Portland Cement Co.
P. O. Box 115
Buffalo, N. Y.

ANOTHER MULTICLONE SUCCESS STORY — TOLD IN 13 WORDS

WHEN WE ASKED this customer how he liked his Multiclone installation, his reply told a lot in a very few words. According to Vice President and General Manager, W. H. Muirhead..."Multiclones make a neater, more satisfactory installation, cheaper to install, easier to operate." At the Gold Hill Plant of the Beaver Portland Cement Company a 24 VD Multiclone handles kiln gases (80,000 CFM at 600° F.), obtaining an excellent dust collection and returning it to the kiln feed. Let us tell you how Multiclones will help solve your dust collection problem. Multiclones are available in assemblies of 6″, 9″ or 24″ diameter tubes providing a range of collection efficiencies to meet your requirements. We have available test units of various sizes for actual demonstration in your plant. Our test units are identical in size to commercial operating installations. Write for full information.



Note simple duct work and flue connections saving installation expense.



Over-all view of Beaver Portland Cement plant at Gold Hill. Note Multiclone in background.

MULTICLONE FEATURES

LOW DRAFT LOSS
SAVES POWER

•

EASY TO ERECT

•

EASY TO INSPECT

•

COLLECTS
FINE PARTICLES
FROM HOT OR COLD
GASES

SATISFIED USERS OF MULTICLONES INCLUDE:

North American Cement Company

Marquette-Portland Cement Company

Santa Cruz Portland Cement Company

Spokane Portland Cement Company

Cowell Portland Cement Company

Universal Atlas Waco

Peerless Portland Cement Company

Medusa Portland Cement Company

AND MANY OTHERS

MULTICLONE

MECHANICAL DUST COLLECTION

WESTERN PRECIPITATION CORPORATION
1015 West Ninth Street, Los Angeles, California

PRECIPITATION COMPANY OF CANADA, LTD.
Dominion Square Building, Montreal

BRANCH OFFICES IN IMPORTANT CITIES

MAIL COUPON FOR BULLETIN

WESTERN PRECIPITATION CORPORATION
1015 W. Ninth St., Los Angeles, California
Please send Bulletin on Multiclone Dust Collectors.

NAME_____

NUMBER_____ STREET

CITY_____ STATE_____

Florida Portland Cement Co.
111 W. Monroe St.
Chicago, Ill.

Ford Motor Co.
Dearborn, Mich.

Georgia Cement & Products Co.
722 Forsyth Bldg.
Atlanta, Ga.

Giant Portland Cement Co.
602 Pennsylvania Bldg.
Philadelphia, Pa.

Glens Falls Portland Cement Co.
205 Lower Warren St.
Glens Falls, N. Y.

Great Lakes Portland Cement Corp.
999 Fuhrmann Blvd.
Buffalo, N. Y.

Green Bag Cement Co. of Pennsylvania
1905 Grant Bldg.
Pittsburgh, Pa.

Green Bag Cement Co. of West Virginia
Kenova, W. Va.

Gulf Portland Cement Co.
North Side Ship Channel, Clinton Docks
Houston, Tex.

Hercules Cement Corp.
1700 Walnut St.
Philadelphia, Pa.

Hermitage Portland Cement Co.
902 American Trust Bldg.
Nashville, Tenn.

Huron Portland Cement Co.
1325 Ford Bldg.
Detroit, Mich.

Idaho Portland Cement Co.
Inkom, Ida.

Ideal Cement Co.
Denver National Bldg.
Denver, Colo.

Keystone Portland Cement Co.
1400 S. Penn Square
Philadelphia, Pa.

Kosmos Portland Cement Co.
1429 Starks Bldg.
Louisville, Ky.

Lawrence Portland Cement Co.
Northampton, Pa.

Lehigh Portland Cement Co.
Young Bldg.
Allentown, Pa.

Lone Star Cement Corp.
342 Madison Ave.
New York, N. Y.

Lone Star Cement Corp., Alabama Div.
Comer Bldg.
Birmingham, Ala.

Lone Star Cement Corp., Indiana Div.
1415 Merchants' Bank Bldg.
Indianapolis, Ind.

Lone Star Cement Corp., Kansas Div.
1811 Federal Reserve Bank Bldg.
Kansas City, Mo.

Lone Star Cement Corp., Louisiana Div.
1120 Hibernia Bank Bldg.
New Orleans, La.

Lone Star Cement Corp., New York Div.
75 State St.
Albany, N. Y.

Lone Star Cement Corp., Pennsylvania Div.
Nazareth, Pa.

Lone Star Cement Corp., Texas Div.
1402 Santa Fe Bldg.
Dallas, Tex., and
1501 Shell Bldg.
Houston, Tex.

Lone Star Cement Corp., Virginia Div.
National Bank of Commerce Bldg.
Norfolk, Va.

Longhorn Portland Cement Co.
200 Alamo National Bldg.
San Antonio, Tex.

Louisville Cement Co.
315 Guthrie St.
Louisville, Ky.

Louisville Cement Co. of New York
Brixment, P. O. Akron, N. Y.

Louisville Cement Corp.
Speed, Ind.

Manitowoc Portland Cement Co.
Manitowoc, Wis.

Marquette Cement Mfg. Co.
140 S. Dearborn St.
Chicago, Ill.

Medusa Portland Cement Co.
1000 Midland Bldg.
Cleveland, O.

Missouri Portland Cement Co
3615 Olive St.
St. Louis, Mo.

Monarch Cement Co.
Humboldt, Kan.

Monolith Portland Cement Co.
215 W. Seventh St.
Los Angeles, Cal.

Monolith Portland Midwest Co.
215 W. Seventh St.
Los Angeles, Cal.

National Cement Co.
430 Martin Bldg.
Birmingham, Ala.

National Cement Co.
P. O. Box 310, Sta. "B"
Montreal, Que., Can.

National Portland Cement Co.
The Bourse
Philadelphia, Pa.

Nazareth Cement Co.
Nazareth, Pa.

Nebraska Cement Co.
Denver National Bldg.
Denver, Colo.

North American Cement Corp.
40 Howard St.
Albany, N. Y.

Northwestern Portland Cement Co.
Northern Life Tower
Seattle, Wash.

Northwestern States Portland Cement Co.
First National Bank Bldg.
Mason City, Ia.

Oklahoma Portland Cement Co.
Denver National Bldg.
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Olympic Portland Cement Co., Ltd.,
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Oregon Portland Cement Co.
111 S. E. Madison St.
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Pacific Coast Cement Co.
Pacific Coast Terminals
Foot of Main St.
Seattle, Wash.

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San Francisco, Cal.

Peerless Cement Corp.
1144 Free Press Bldg.
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Pennsylvania-Dixie Cement Corp.
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Permanente Corp.
1522 Latham Square Bldg.
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2200 Grant Bldg.
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Portland Cement Co. of Utah
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Salt Lake City, Utah

Riverside Cement Co.
621 S. Hope St.
Los Angeles, Cal.

St. Mary's Cement Co., Ltd.
357 Bay St.
Toronto, Ont., Can.

San Antonio Portland Cement Co.
1301 W. Martin St.
San Antonio, Tex.

Santa Cruz Portland Cement Co.
Crocker Bldg.
San Francisco, Cal.

Signal Mountain Portland Cement Co.
530 Volunteer Bldg.
Chattanooga, Tenn.

South Dakota Cement Plant
Rapid City, S. D.

Southern States Portland Cement Co.
Rockmart, Ga.

Southwestern Portland Cement Co.
727 W. 7th St.
Los Angeles, Cal.

Spokane Portland Cement Co.
724 Old National Bank Bldg.
Spokane, Wash.

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Superior Cement Corp.
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Superior Portland Cement, Inc.
1003 Seaboard Bldg.
Seattle, Wash.

Three Forks Portland Cement Co.
Denver National Bldg.
Denver, Colo.

Trinity Portland Cement Co.
1618 Republic Bank Bldg.
Dallas, Tex.

Union Portland Cement Co.
Denver National Bldg.
Denver, Colo.

United States Portland Cement Co.
Denver National Bldg.
Denver, Colo.

Universal Atlas Cement Co.
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New York, N. Y.

Valley Forge Cement Co.
Fuller Bldg.
Catasauqua, Pa.

Volunteer Portland Cement Co.
Fidelity Bankers' Trust Bldg.
Knoxville, Tenn.

Vulcanite Portland Cement Co.
15th & Chestnut Sts.
Philadelphia, Pa.

Wabash Portland Cement Co.
National Bank Bldg.
Detroit, Mich.

Washington-Idaho Lime Products Co.
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Whitehall Cement Mfg. Co.
2538 Fidelity-Philadelphia Trust Bldg.
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Ford Bldg
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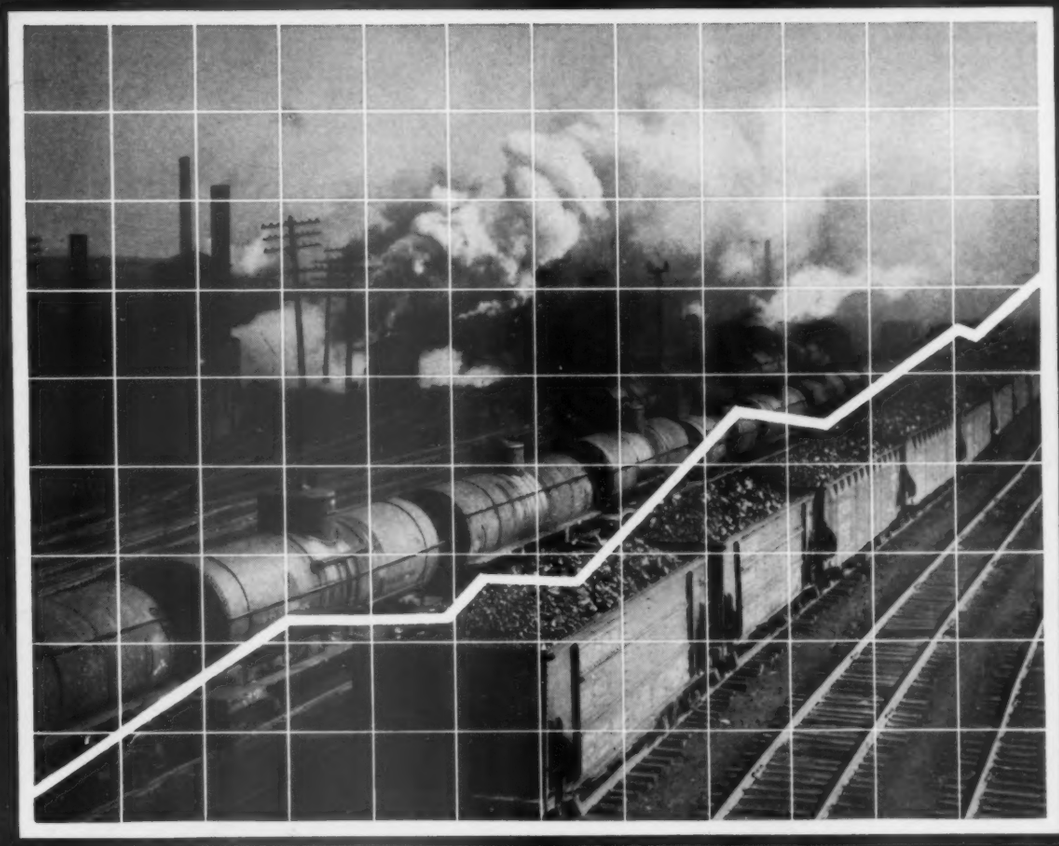
YOUR *FUEL BILLS* MAY BE GOING UP...



BUT YOUR *FUEL COSTS* CAN GO DOWN!

As production loads grow heavier, you're sure to spend more money on fuel. How much more depends largely on how well your equipment is insulated. To help keep rotary cement and lime kilns operating at peak efficiency and economy, plant engineers rely on J-M Superex Blocks.

This modern insulation can help you save money, too. It cuts down on fuel consumption ... increases flue gas temperatures ... assures more uniform heat distribution. As a result, kilns are decidedly more efficient and economical.

Maintenance stays low, for Superex is strong and durable ... built to withstand the severe punishment of rotary-kiln service. And because Superex Blocks are easy to handle ... available in a wide variety of widths, lengths and thicknesses ... they are simple and low-cost to install.

• • •

For full details on J-M Superex Blocks and information on other J-M Insulating Materials for the cement and lime industry, write Johns-Manville, 22 East 40th Street, New York, N. Y.

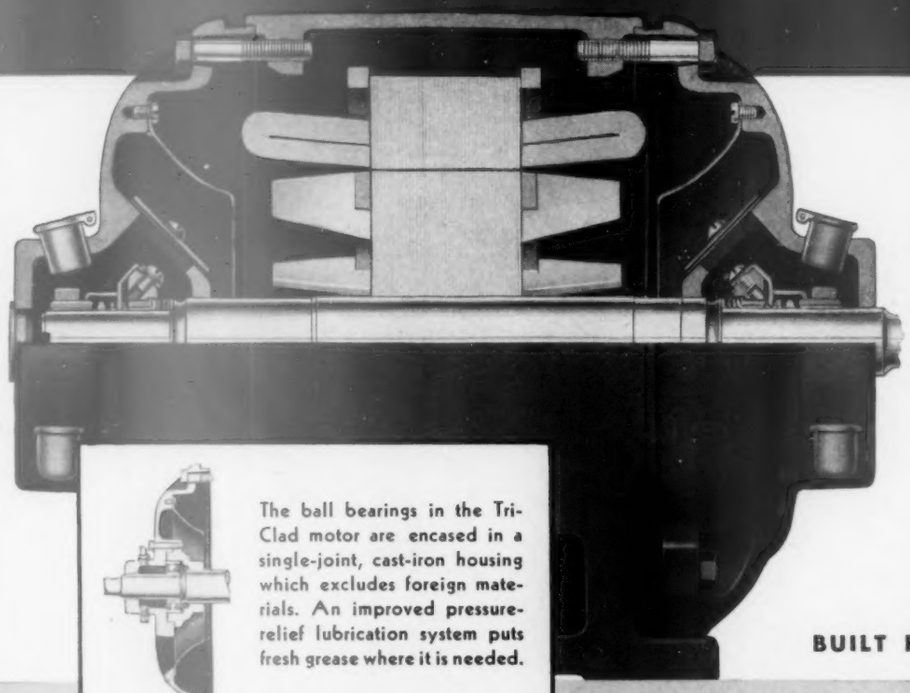
Johns-Manville INDUSTRIAL INSULATIONS

FOR EVERY TEMPERATURE ... FOR EVERY SERVICE ...

Superex ... 85% Magnesia ... Asbesto-Sponge Felted ... Sil-O-Cel ... Marinite ... Anti-Sweat ... Rock Cork

We Cut Your MAINTENANCE WORRIES

WHEN WE CUT THE ENDS OFF THE BEARINGS!



The ball bearings in the Tri-Clad motor are encased in a single-joint, cast-iron housing which excludes foreign materials. An improved pressure-relief lubrication system puts fresh grease where it is needed.

In the Tri-Clad motor, G.E. uses a SHORTER sleeve bearing for LONGER life

This *shortened* sleeve bearing has higher load-carrying capacity and longer life. Positive lubrication is assured by its corrosion-resisting oil ring and improved spiral grooving—the bearing runs full of oil regardless of the direction from which the load is imposed.

1 to 20 hp now available.

BUILT FOR PROTECTION FIRST . . . . TO LAST!

TRI CLAD

REG. U.S. PAT. OFF.

INDUCTION MOTORS

GIVE EXTRA PROTECTION 3 WAYS

Extra Protection

AGAINST

PHYSICAL DAMAGE

The strong, one-piece, cast-iron frame and end shields, with upper portion completely enclosed, protect vital motor parts from external blows, flying chips, settling dust, and dripping liquids.

Extra Protection

AGAINST

ELECTRICAL BREAKDOWN

Stator windings of Formex wire resist moisture, oil, and "heat shock." A tough, synthetic resin bonds the coils, and a coat of Glyptal No. 1201 Red on the end windings completes the insulation.

Extra Protection

AGAINST

OPERATING WEAR AND TEAR

For years, G-E motor designers have been experimenting with sleeve bearings of all kinds. They have found that a shorter sleeve bearing—one with new diameter-to-length proportions and a more effective spiral grooving—is a fundamentally better bearing; that such a bearing could successfully withstand the stress imposed by short-center, hinged-base drives and similar applications.

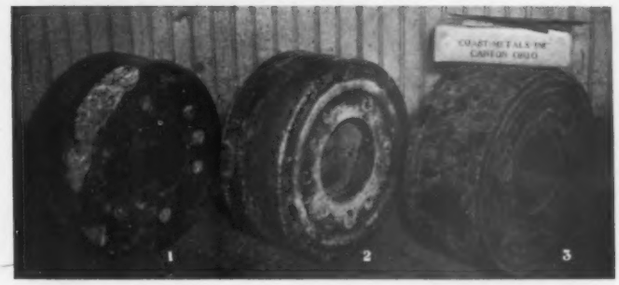
In addition, the new sleeve-bearing housing on Tri-Clad motors is dust- and oil-tight. These and many other features are your assurance of a dependable, free-running motor.

You'll find that Tri-Clad motors are unusually quiet and smooth running. They'll give your production *extra protection* during *extra* years of service. General Electric Co., Schenectady, N. Y.

Write for Bulletin GEA-3580 and specify Tri-Clad on your next motor order.

GENERAL ELECTRIC

DEFENSE *Against* WEAR



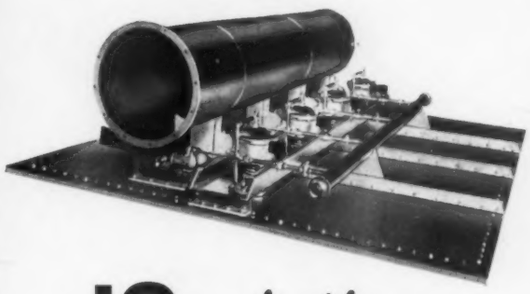
The above picture shows how one progressive cement-mill operator is saving money by protecting all wearing parts of his grinding mills with a coating of Coast Metal No. 112. He formerly used hardened cast swing rolls which did not give satisfactory life and frequently broke after a short run. He solved his problem by using forged rolls coated with Coast Metal. Breakage has been eliminated, the rolls last much longer; and their grinding efficiency is greater, as the coated rolls wear down more evenly than the uncoated ones. It is no longer necessary to scrap the rolls since the coating can be renewed as often as necessary. The two rolls on the right are hard-surfaced; the one on the left is the type formerly used.

Coast Metals are made in several types for specific services. May we assist you with your maintenance problems?

COAST METALS INC.
Canton, O.

"NORBLO Collects our Dust!"

— Santa Cruz Cement Co.



19 *of these* NORBLO

Automatic Bag Type Dust Arresters

have been installed since November, 1939, in the plant of the Santa Cruz Cement Company of Davenport, California. And two more NORBLO installations are now under way!

This plant is well known on the West Coast, having been an important factor in local cement production since 1906. A large-scale modernization plan to "step up" plant efficiency is nearing completion.

All the new units of the dust-collector equipment were furnished by NORBLO. The Santa Cruz management states:

"They have been most satisfactory, since they are the only collectors we have used that will handle dust-laden air of high moisture without plugging the cloths."

The NORBLO Automatic Bay Type Dust Arrester provides positive, progressive cleaning which functions with practically no drop in static pressure throughout the operating cycle.

The NORBLO is simply designed, and sturdily built to operate continuously under heavy loads for long periods. The complete shaking unit is mounted on an extra heavy top plate. Working parts are in the clear for easy inspection.

NORBLO Arresters work at peak efficiency, since the dust accumulation in the bags is held to a minimum. Compartments may be inspected safely at any time. One unit can be withdrawn from the line, and repairs made, without "holding up" operations.

Write for full Details

The NORTHERN BLOWER CO.
6409 Barberton Ave. Cleveland, Ohio

The Millville pump which handles the classifier products for the Valley Forge Cement Company, of West Conshohocken, Pa.

TOP RANK CEMENT PRODUCERS Get the Right Slant on Pumps from MILLVILLE for TOP RANK PERFORMANCE AND ROCK BOTTOM COSTS

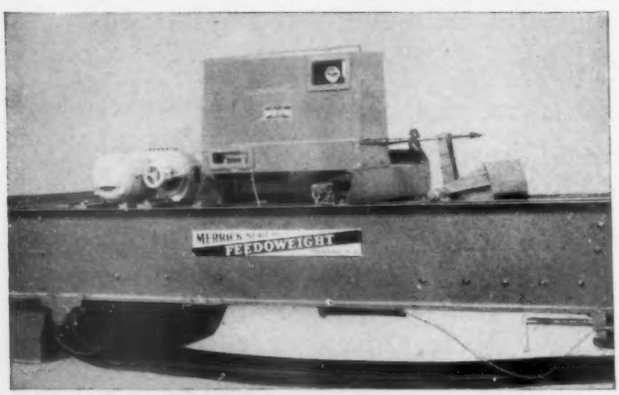
Write for Information on Dredge Pumps

Sand Dredges
Dredging Pumps
Steam Coil Dryers
Rotor Dryers
Gravel Screening Plants

MILLVILLE IRON WORKS, INC.
Millville, New Jersey

THE **MERRICK** WAY is the **FASTEST** Weigh
. . . for materials on the move

Cement
Lime
Gypsum
Sand
Gravel
Crushed Stone



WEIGHTOMETER

for all producers of lime, cement, sand, or other bulk materials that require handling by belt conveyor. It gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. YOU NEED this dependable check on production figures supplied by Merrick WEIGHTOMETER.

Write for Information. .

FEEDOWEIGHT

automatically feeds, weighs, totals and records the amount of material fed. Power operated feed and control-gate for correct proportioning. Feeds two or more materials in batch or continuous proportioning.

MERRICK SCALE MFG. CO.
Automatic Continuous Weighing Machines
PASSAIC NEW JERSEY

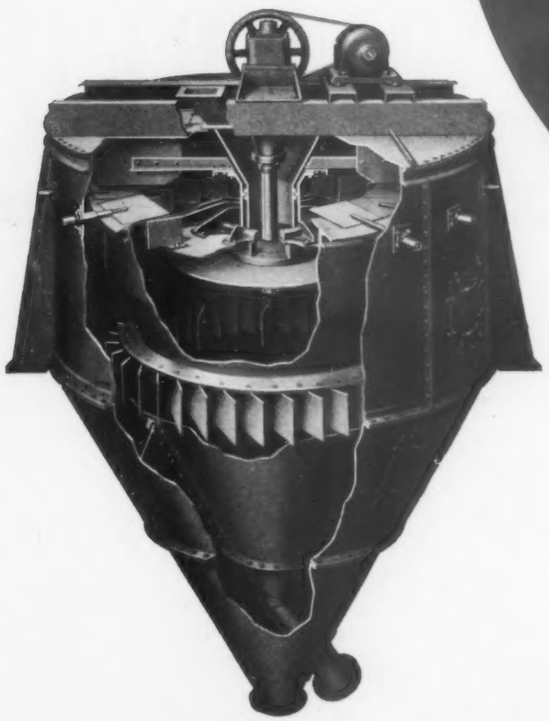
STURTEVANT

100% Acceptance Record

288 Sold on Approval

All Accepted—None Rejected

STURTEVANT Air Separators



Perfect score!—that's how the Cement Industry endorses STURTEVANT Air Separators. In cement plants alone, 288 STURTEVANTS were sold, installed and operated with complete satisfaction, every one a bullseye hit in performance.

In other industries STURTEVANT Air Separators are doing an equally efficient job of classifying materials . . . from 40-mesh to 350-mesh and micron sizes. For easy and positive control of particle sizes, and maximum output and uniformity of finished product, specify a STURTEVANT.

Place your separating problem in the capable hands of Sturtevant engineers.

Write for Information

STURTEVANT MILL CO. BOSTON, MASS.

The Outstanding performance of Republic Conveyor Belting . . . interpreted into various terms of economy and efficiency in the records of users the country over . . . is most completely described by that familiar phrase. Lower cost per ton hauled, fewer operating difficulties, less upkeep—all such specific advantages are traceable to the capacity of these powerful, long-lived belts to keep rolling. Republic is a nationally recognized authority on determining the most serviceable combination of conveyor belt materials and design for the particular working conditions. Every Republic Conveyor and Elevator Belt is Provar Processed —permanently treated against mildew. REPUBLIC RUBBER DIVISION OF LEE RUBBER AND TIRE CORPORATION, YOUNGSTOWN, OHIO.

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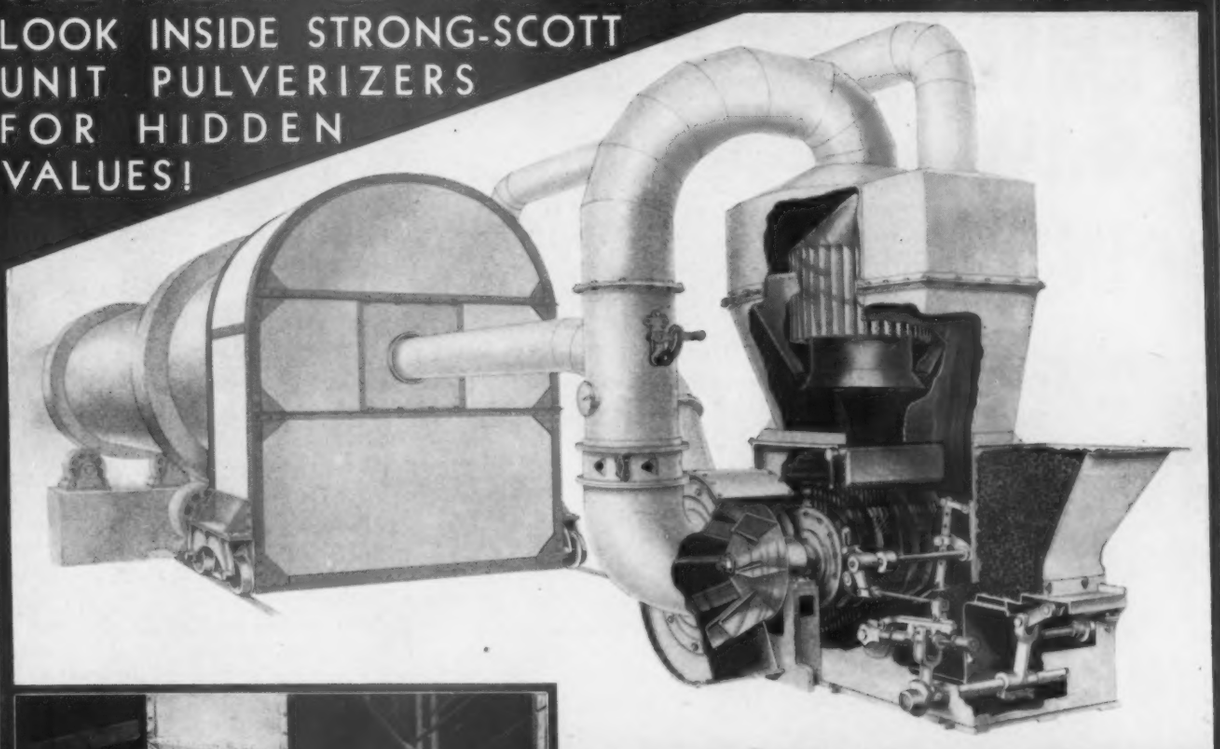
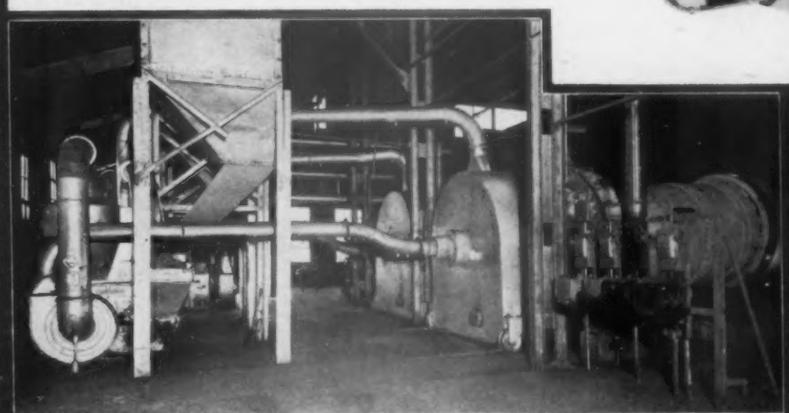
THE MEAT OF THE COCOANUT IS INSIDE

LOOK INSIDE STRONG-SCOTT UNIT PULVERIZERS FOR HIDDEN VALUES!





PICTURE ABOVE PERMITS VIEW INSIDE THIS PULVERIZER TO SHOW DESIGN OF FEEDER, GRINDING CHAMBER AND CLASSIFIER. ALL INCOMING COAL IS DEPOSITED **BELOW** ROTOR & DOES NOT TOUCH IT. AT LEFT, IS ACTUAL INSTALLATION

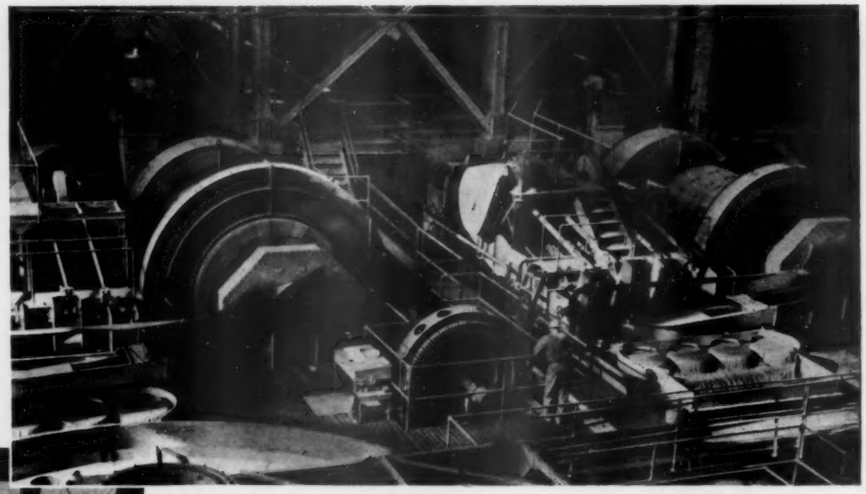
STRONG-SCOTT UNIT PULVERIZER FOR DIRECT-FIRING KILNS, DRIERS, OR WASTE-HEAT BOILERS, HAS THE EXCLUSIVE ADVANTAGES OF UNDER-FEED, AIR-ATTRITION GRINDING, PLUS A VERY **THOROUGH** ELIMINATION OF COARSE COAL PARTICLES. IT FUNCTIONS MORE LIKE A TRUE FUEL-CARBURETOR THAN ANY OTHER DIRECT-FIRING PULVERIZER MADE.

Representatives in principal cities

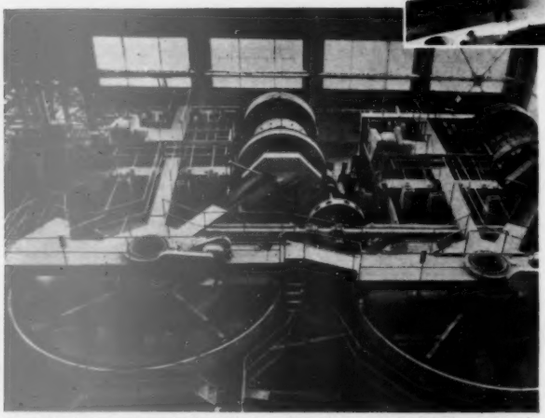
THE STRONG-SCOTT MFG. CO.

Minneapolis, Minnesota

BETTER CEMENT RAW GRINDING



Step 1—Primary ball mills in closed circuit with Dorr Classifiers.



Step 2—Secondary ball mills in closed circuit with Dorr Bowl Classifiers.

Step 3—Dorr Thickener concentrating bowl classifier overflow to slurry density.

Step 4—Dorr Slurry Mixers correcting thickened slurry.

THROUGH DORR C. C. G.

The Dorr C.C.G. (Closed Circuit Grinding) System, grinding to 90-98 percent minus 200 mesh, requires only 3-4 K.W.H. per barrel of raw wet grinding—½ to ⅔ the average for the cement industry.

It pays for itself through power and other savings. It helps to produce a stronger and sounder finished cement through uniformly fine grinding and the elimination of coarse, tramp oversize in the kiln feed.

Practically every new wet process plant built in this country since 1935 has installed Dorr C.C.G. for capacities ranging from 2,500-12,000 barrels per day. It may be installed, too, in existing mills seeking greater economy and quality.

ADVANTAGES

Less Grinding Power—35 to 50% less.

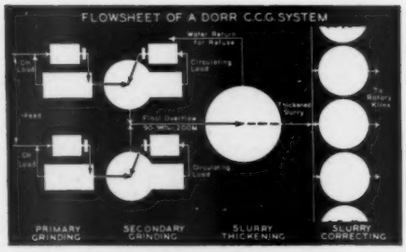
More Ball Mill Capacity—100 to 125% more.

No Tramp Oversize—less than ¼ of 1 percent plus 100 M when overflowing 96 percent minus 200 mesh.

More Uniform Kiln Feed—less than 6/10 of 1 percent $CaCO_3$ variation.

If you are about to build, re-equip or shift from dry to wet processing, write for 16-page technical reprint on Dorr C.C.G., complete with flowsheets, operating data, cost analyses, etc.

9 Dorr C.C.G.-equipped mills have an aggregate capacity of 43,650 barrels per day.



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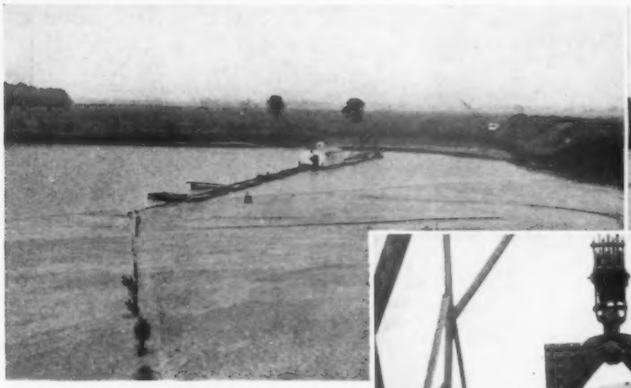
Dorr services are also available from associated companies and representatives throughout the world.

80-Foot Screen-Nozzle Cutting Ladder Installed on Dredge at Gravel Plant



ABOVE—The dredge and stripping operations as viewed from the screening tower at the England plant.

ABOVE—The plant as it appears from a forward pontoon on the dredge.

LEFT—The 80-foot ladder raised for inspection. Note the series of supporting pontoons.

By HARRY F. UTLEY

WHEN designing a plant or selecting equipment the operator is usually able, from the array of efficient machinery now on the market, to find just what he needs to solve his particular production problems. Occasionally, however, special devices or adaptations of standard equipment must be worked out with the manufacturer to meet unusual local conditions.

This was the case with the Charles England Gravel Company, which has been dredging sand and gravel from a deposit near Plainville, Indiana for a number of years. The deposit is definitely of glacial origin and occurs in a broad and deep pocket near the extreme southern tip of the glacial boundary as defined by geologists. The material is of high quality —dense, well proportioned, and free from soft particles that are likely to exist in most glacial drifts. The finest gravel and sand, nevertheless, are found below the 35-foot level of the pond.

To reach this material effectively the company recently installed a mighty 80-foot Eagle "Swintek" screen-nozzle ladder—said to be the longest Swintek ever built. The ladder, because of its unusual length, was built and shipped in two sections. It was taken from the railroad cars at Plainville and transported to the plant in special trailer-trucks. Now it is installed between a series of forward pontoons ahead of the company's 16- by 36-foot steel dredging barge and often operates as deeply as its full 80-foot length will allow, the normal depth being about 65 feet. The chain openings are 4 by 5 inches and an 8-inch Goodyear suction hose is used. Leschen wire rope is employed to lift the ladder and swing the dredge. The ladder, boom- and shore-line hoists are driven by countershafting and Link-Belt chain from the dredge-pump engine.

Because of the extreme pumping depth and the 45-foot static head encountered in bringing up the material and transporting it through 500 feet of 6-inch pipe to the top of the plant, a special dredge pump was also necessary. This problem was solved with an Amsco counterflow pump with an 8-inch suction and a 6-inch discharge, fitted to special bearings and a base which were designed and built by the gravel company. It has a wide, funnel-mouth impeller, and internal wear has been greatly reduced by the introduction of clear water under pressure between the impeller shrouds and the shell side-plates. The clear water, entering through the pipes shown in the illustration, replaces the abrasive, sand-laden water normally sucked up from the deposit. The pump is driven by a Cummins 125-horsepower Diesel engine. The engine is equipped with a 24-volt starter and generator which, in connection with storage batteries, also supplies current for lights on the dredge.

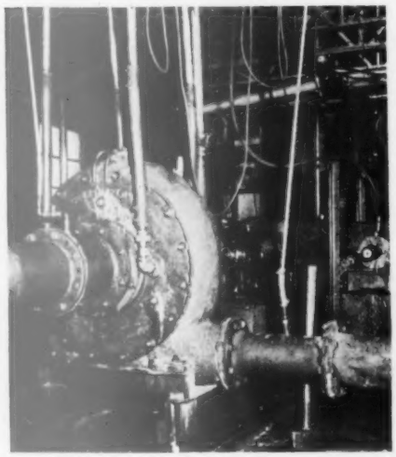
The floating pipe is carried on drum pontoons and its sections are connected with Goodyear sleeves. Fuel is carried to the dredge by a small steel scow on which two drums are permanently mounted. These are filled by gravity through a pipe-line and hose from the oil-house located at the plant. The "tanker" is then rowed out to the dredge and the fuel transferred.

The deposit is stripped to a depth of about 9 feet by a P & H 600 drag-line equipped with a 1-cubic yard bucket and a 45-foot boom. An 800-foot face is worked, the spoil being cast back 150 feet at each side by the drag-line and hauled away from the 500-foot center portion by dump trucks to a worked-out section at the opposite end of the pond.

The force of the discharged material at the top of the plant drives a rotary screen equipped with 1½-inch round-hole plate which scalps out the oversize, some of which is by-passed to a 4- by 12-inch Continental jaw-crusher. The throughs from the revolving screen

A view showing the settling tank and flumes. Drag-line and sand-loading bin in background.

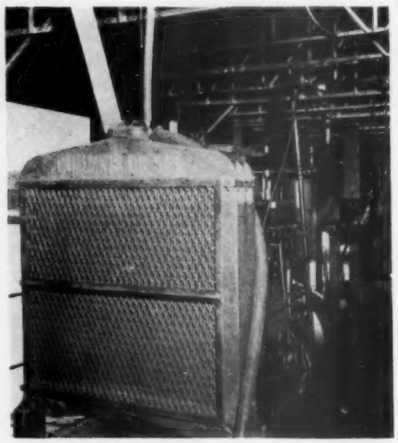
are separated by three inclined stationary screens equipped with Twin City wire cloth, the sand being taken out at



The counterflow dredge pump. Pipes entering through side plates introduce clear water under pressure to minimize wear.

the first screen, which carries 5/16-inch square mesh cloth. The screening tower is inclosed with ¼-inch abrasion-resisting steel welded to prevent water leakage. The sand is flumed through a welded-steel trough to an elevated settling tank about 75 feet distant. A Thew gasoline drag-line with a 46-foot boom loads the sand into a 2-compartment steel truck-loading bin of 50 cubic yards capacity. The gravel is stored in a 120-ton 3-compartment bin beneath the sizing screens. Manually-controlled gates at the bottoms of the compartments control the loading of the finished gravel into trucks. Considerable surplus material in a wide range of sizes is also held in open storage.

Left to right—William England, superintendent; E. E. Tarr, assistant superintendent; and Charles England, owner and general manager.

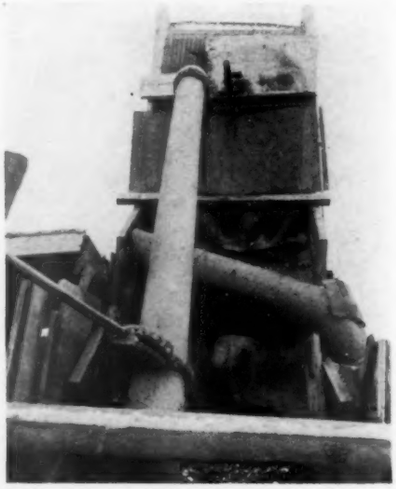


The 125-horsepower Diesel engine on the dredge.

The company owns seven Ford V-8 trucks equipped with Wood hydraulic-dump bodies for making deliveries, disposing of overburden, etc. One of these has been "Dieselized" as an experiment, being powered by a Hercules Diesel engine.

Charles England is the owner and general manager. He also owns and operates a well-equipped machine shop in Plainville where much of the equipment used at the plant is fabricated. He has been in the sand-and-gravel business for the last 13 years. During the first seven years he dredged material from the bed of the White River which adjoins his present workings. The plant he now operates went into service in May, 1935. Its present capacity is about 40 tons per hour.

By far the greater share of the output is sold for highway construction and maintenance. A considerable tonnage of engine sand is also produced. At present aggregates are being moved in quantity to the Burns City Naval Ammunition Depot, a defense project under construction about 20 miles distant from the plant, and to Federal Levee Project No. 8 along the west fork of the White River in Daviess County.



Dredge pipe-line at discharge point on screening tower.

The plant property covers about 80 acres. Some of it is in timber, providing a convenient and economical source of piling, props, etc. The pond has been stocked with 100,000 bass, bluegills and catfish, but has been closed to overflow water since April, 1937. It should be the realization of a fisherman's dream within the near future.

Ideal Improving Gulf Plant at Houston

A number of improvements are being made at the plant of the Gulf Portland Cement Company at Houston, recently taken over by the Ideal interests of Denver.

Four storage silos 30 feet in diameter and 90 feet high have been erected. Another kiln, 9 by 220 feet in size is being installed and several additional raw- and finish-grind units are shortly to go into service.

52 Lime Manufacturers Attend Annual Meeting of Industry at Hot Springs

THE twenty-third annual convention of the National Lime Association drew 52 lime manufacturers to its sessions at Hot Springs, Virginia, May 28 and 29. Twenty-eight lime-producing companies and 14 states were represented.

Following the reading of the minutes of the 1940 convention and of the treasurer's report, Howard R. Staley, assistant professor of building construction, Massachusetts Institute of Technology, reported on *Studies on the Use of Lime in Concrete*. The investigations made under his supervision showed that concrete containing 50 pounds of lime-for-cement substitution is the best under all three types of curing. The substitution of hydrated lime for cement improves the workability of the concrete, he said.

Dr. L. S. Wells of the National Bureau of Standards in Washington offered some *Observations on Lime in Relation to the Industry*. He urged lime manufacturers to study competitive products to ascertain their properties and advantages. More research is badly needed, he said. Knowing his product's best properties, the lime manufacturer should concentrate on them and should develop those markets for which his product is best. He should not try to sell his lime for every purpose. The association, he said, can carry on research of that kind and on a scale which the individual manufacturer, especially the small one, can not afford. An educational campaign on plastering practice is also needed.

Dr. Wells mentioned the use of hydraulic limes in mass concrete in Europe. In France in 1928, he said, 2½ million tons of hydraulic lime was produced, compared with only 5 million tons of Portland cement. He thought that this field has great possibilities which are still little understood by American manufacturers.

Chemical markets, which are taking over half of this country's total lime output, are of sufficient importance to justify careful study.

The Future of High-Lime Mortars was discussed by Walter C. Voss, professor of building construction, Massachusetts Institute of Technology. Speaking of research, he said it too often was nothing but an attempt to make a case for a product instead of being a sincere and intelligent effort to ascertain the truth. Specifications are often based on inadequate knowledge and excessive wishful thinking, he said, and he deplored the lack of facts concerning certain products and their behavior. They may delay the increasing use of a product but can not prevent it.

John A. Robertson, chief engineer, construction department, National Lime Association, in his address on *A Practical Approach to Architects and Engineers,* emphasized the importance of making contacts with architects because of the fact that more than three-fourths of all construction work is architect-designed.

Progress in Structural Investigations on Lime gave Dr. G. L. Clark, professor of chemistry, University of Illinois, an opportunity to explain the X-ray analysis of mineral structure and the operation of the electron microscope. By X-ray diffraction it is possible to photograph the structure of materials, and show definite patterns, or "fingerprints," for dolomite, calcite, magnesia, CaO, Ca $(OH)_2$, MgO and $Mg(OH)_2$.

He showed how, with this knowledge, it is possible to make certain compounds which, while of the same composition as the natural ones, differ considerably in their properties. Thus, a lead oxide made from lead hydroxides at the lowest temperature and in the shortest time, is materially different from the natural lead oxide. The product is imperfect because it has been distorted by these new conditions.

MgO made in this way can be hydrated very easily. Its crystalline pattern is imperfect, its heat of solution is higher, more potential energy is present. Ordinary MgO hydrates slowly so pressure is needed to complete the process. The greater potential energy in the new-type MgO assists in its hydration.

The speaker mentioned the invention, by Dr. McIntyre of the University of Tennessee, of a process of burning dolomitic lime at 700 degrees C. in an atmosphere of steam. The autoclave method of pressure hydration of MgO to $Mg(OH)_2$ doubles the adsorption power of the CaO; the extra water picked up is available.

Dr. Clark's remarks were well illustrated by stereopticon slides.

The use of lime in soil treatment was discussed by Dr. J. W. White, professor of soil technology, Pennsylvania State College, who spoke on *Sour Soils and Liming*. He showed a map of Pennsylvania with marked areas where lime in the amount of 8 tons per acre should be applied to sweeten the acid soil. The Pennsylvania "Dutch," who settled the state early in this country's history, fed their cattle well to get their manure for use on the land. Lancaster County is credited with the highest productivity per acre among all the counties in the United States.

The fertility of the soil, the speaker explained, is measured by the amount of bacterial activity in it. The best soils are those that have the most bacteria and the highest rate of organic-matter decay. A soil whose rate of decay is taken as 100, for comparative purposes, will have 85,300,000 bacteria per gram and a pH rating of 7.3.

Dr. White said that fertilizer and lime should be used together because neither one acts adequately or as well when used alone as when used in conjunction.

The Quality Lime Institute has prepared a series of educational slides revealing the results of the use of lime. Shown to farmers and boys of school age, it demonstrates the superiority of both burned and hydrated lime over pulverized limestone in both the amount and the availability of lime oxides (calcium oxide and magnesium oxide). The pictures were presented as visual testimony supporting the association's plea for the use of more lime in agriculture.

According to Dr. Willem Rudolfs, professor, Department of Water Supply and Sewage Disposal, Rutgers University, who spoke on *Studies on Lime in Sewage Treatment,* 40,000,000 American city dwellers have facilities for treating their non-industrial wastes. In 1929 there were 2,700 sewage-treatment plants in the United States, in 1940 there were 5,400.

The speaker explained that lime is used in three ways in the treatment of sewage:

(1) To control the reaction in sludge digestion alkaline substances are needed. Quick-acting lime greatly increases the bacterial activity.

(2) In the coagulation process iron and aluminum salts are used. When lime is used less iron salts is required and the cost is much reduced.

(3) In dewatering the resulting sludge, of which large quantities are produced, lime is added to the aluminum salts to facilitate the dewatering. A town of 10,000 inhabitants will produce 1 ton of dry solids per day.

Another large potential field for the

use of lime lies in the neutralization of industrial wastes.

The sludge can be destroyed, dumped or utilized. In the last 10 to 15 years its use has been increasing. The agriculturist feels that if sludge is used his land will be injured after a few years' use, because of the introduction of large amounts of organic material, which increases the acidity of the soil. The addition of lime prevents this injury.

Lime also controls the odors by sweetening the sewage. The sewage produces acetic compounds that corrode concrete structures—tanks and pipes—and lime is added to prevent this; chlorine is added to kill the bacteria that cause the corrosion. Some limes work well in water but not so well in sewage, while other limes operate in the opposite way.

The industry needs research to discover the principles of behavior of various kinds of lime in sewage treatment, Dr. Rudolfs said. Two high-calcium limes of identical oxide content, water solubility, particle size, etc., can behave so differently that one will give from 20 to 30 per cent. better results than the other. One will precipitate the phosphate found in sewage; the other will not. One lime is more active than the other in its action on certain ingredients. Theoretically, high-magnesium lime should be better than high-calcium lime, but the reverse is true; the high-calcium costs less.

Lime can be used as a flocculating agent, and is better when used as a watery solution than when used dry. The speaker expressed the hope that the solubility of lime can be increased so that it can be used in many more places. The best results are obtained when the pH value is about 9.6. The phosphate content could be raised and the sludge made more suitable for agricultural purposes.

The university's research program for the next year, according to Dr. Rudolfs, will cover the recovery, coagulation and neutralization of those industrial wastes which respond to treatment with lime. In the coagulation process lime will take the place of iron and aluminum salts if it can be made more active.

Victor J. Azbe, consulting engineer, discussed *Center-Burner Fired Automatic-Draw Kilns,* in the development of which he has been active for twenty years. At previous conventions he had told of the center burner, and on this occasion he described the latest development—the mechanical draw. He illustrated his description with slides which showed how the kilns are charged and drawn. He described, too, the storage chamber or zone at the top of the kiln, the arrangement of the CO_2 off-take pipe and secondary-air and gas ducts, and the control devices. Shown also were the side-burner and center-burner arrangements and sectional views comparing the new type of kiln with the old hand-fired type.

Of the mechanical draw Mr. Azbe said that it almost eliminates the condition known as "hung" kiln, because the downward movement of the lime in the kiln is slow and continuous and there are no crushing falls and very little breakage. As the gas passages are therefore freer, the gases distribute themselves more nearly uniformly throughout the mass. The capacity is increased at any given draft, and a rate of between 2,500 and 3,000 pounds per square foot of kiln-shaft cross-sectional area is being obtained with a draft between 3 and 4 inches. The fuel ratio is better, according to the speaker, and the lime has a better appearance, being whiter, softer burned, and of more open structure. Automatic drawing also corrects to a large extent the troubles resulting from small stones obstructing the flow of gas, from stratification and from draft resistance. The heat in the hot zone is more nearly uniform. There is no packing of the completely-calcined lime against the refractory lining—a common occurrence when the drawing is done intermittently—and there is no resulting overheating and softening of the lining, or combination of the lime and brick substances. An increase in kiln efficiency results. Kiln-top temperatures are also equalized when the kiln is equipped with a superimposed storage zone, the fluctuations remaining within a narrow range at about the 500-degree F. point. Secondary combustion is thus prevented.

W. R. Cliffe, consulting lime engineer of Hershey, Pennsylvania, read an interesting paper on *Rotary Kiln Practice in Lime Burning.* Mr. Cliffe is general superintendent of H. E. Millard's five crushed-stone and lime plants near Annville, Pennsylvania. He discussed long rotary kilns and their effects on the fuel-lime ratio, especially when fitted with heat exchangers. As his paper has already been published (*P&Q,* June, 1941, pages 42 to 44) no further reference will be made to it here.

The results of the 1940 lime-safety contest, announced at the meeting, appear on page 28 of this issue.

At its meeting on May 28 the board of directors elected and appointed the following officers and members of the executive committee to serve during the new year:

Officers

K. L. Hammond, chairman (Keystone Lime Works, Inc., Keystone, Alabama)

S. Walter Stauffer, president and general manager

W. Vernon Brumbaugh, secretary and assistant treasurer

James H. McNamara, treasurer (Eagle Rock Lime Company, Eagle Rock, Virginia)

Roma F. Medford, assistant secretary

Executive Committee

K. L. Hammond, chairman (Keystone Lime Works, Inc., Keystone, Alabama)

Henry La Liberte (Cutler-Magner Company, Duluth, Minnesota)

Fred Witmer (Ohio Hydrate & Supply Company, Woodville, Ohio)

B. L. McNulty (Marblehead Lime Company, Chicago)

Reed C. Bye (Warner Company, Philadelphia)

As a result of the recent election in the various districts of the lime industry, the following members were chosen to serve on the board of directors during the fiscal year beginning July 1, 1941:

Directors

District 1: C. C. Loomis (New England Lime Company, Adams, Massachusetts)

District 2: (election not yet completed)

District 3: (election not yet completed)

District 4: J. A. Dunaway (Peery Lime Company, Inc., North Tazewell, Virginia)

District 5-A: Wilfred W. Sprague (National Mortar & Supply Company, Pittsburgh) and Fred Witmer (Ohio Hydrate & Supply Company, Woodville, Ohio)

District 5-B: Russell Rarey (Marble Cliffe Quarries Company, Columbus, Ohio)

District 6: Gordon W. Hughes (Inland Lime & Stone Company, Manistique, Michigan)

District 7: (election not yet completed)

District 8: C. E. Brady (Allwood Lime Company, Manitowoc, Wisconsin)

District 9: Henry La Liberte (Cutler-Magner Company, Duluth, Minnesota)

Districts 10 and 11: K. L. Hammond (Keystone Lime Works, Inc., Keystone, Alabama)

District 12: Paul Sunderland (Ash Grove Lime & Portland Cement Company, Galloway, Missouri)

District 13: Cecil R. Haden (Haden Lime Company, Houston, Texas)

District 14: Eric A. Johnson (Washington Brick & Lime Company, Spokane, Washington)

District 15: (no election)

Effect of Priorities on Sand Industry Is Dominant Topic as N.I.S.A. Convenes

THE sixth annual convention of the National Industrial Sand Association, held at the Homestead, Hot Springs, Virginia, June 19 and 20, was undoubtedly the most important meeting of that group. As might be expected, the chief topic of discussion was coöperation in the national defense effort and related subjects. Dr. E. E. Pratt regional coördinator of the Division of Priorities of the Office of Production Management was the guest speaker and he gave some very enlightening information on priorities, the reasons for them, their application, etc.

According to Dr. Pratt, priorities are necessary because the supplies of certain raw materials and certain types of equipment are insufficient for both civilian and military needs. He cited aluminum, magnesium, rubber, and machine tools as examples. The shortage, he said, extends also to ships bringing in foreign raw materials.

The Division of Priorities of the O.P.M., said Dr. Pratt, divides necessary materials into two groups. One group given priority rating assignments includes more-or-less finished materials in the order of their importance. The second calls for allocation of certain raw materials. Attempts are being made to control the movements of both types of materials.

There are four methods of control of these materials according to the speaker. There are individual preference-rating certificates for materials going directly or indirectly into defense work. The Army and Navy have a list of about 200 critical items and a directory which specifies their order of importance. There are general blanket preference ratings for manufacturers making things important to the defense program. Project ratings or letters are given to each project. There is also a defense supplies rating plan, sometimes called the "off-the-shelf" plan, for any industry or type of material needed for defense which can not easily be identified in the final product. Each company, said Dr. Pratt, must show the priorities division what percentage of its product is for defense and its priority ratings are adjusted accordingly. No provision has yet been made for repairs and replacements but a plan will soon be announced.

According to Dr. Pratt, there are also four methods for controlling raw-material supplies. General Metals Order Number 1 is as yet only a mild form of inventory control but can be made more severe if necessary. The General Steel Preference Delivery Order carries inventory control on these materials much farther. The supplier must see that his products are sold primarily for defense purposes. Any industry or company can appeal if not satisfied with its treatment. Industry-wide mandatory control can be applied by the board to very scarce materials. For example, the entire supply and output of aluminum has been definitely allocated. Other materials, such as zinc, have been only partially allocated. The entire output of machine tools has also been definitely allocated.

Members and guests at night picnic held at the Cascades.

Dr. Pratt cautioned that priority ratings on orders received need not be considered except in connection with the stipulated delivery date. Only in this respect does the highly-rated order take precedence over others. He also said that considerable development of the system of priorities is to be expected and that growing scarcities will make stricter control necessary. He said that industry will have to find substitutes for scarce materials and that work will have to be spread on some contracts. Considerable migration of labor will be necessary and there will be many restrictions on the civilian population. Limitations may be placed on travel, luxuries and semi-luxuries, imports, etc. Standardization of products will be made to further more efficient production.

Dr. Pratt then said that there are eight cardinal principles guiding the work of the Priorities Division. They are:

1. The requirements of the Army and Navy must be provided first.
2. Non-essentials must not be allowed to interfere.
3. Hardships on industry and civilians will be softened as much as possible.
4. The production of all essential materials will be stressed to the fullest extent.
5. The use of substitutes will be encouraged.
6. All decisions will be made speedily by putting power in the hands of individuals advised by committees.
7. Decisions will be made public as quickly and clearly as possible.
8. Red tape will be kept at the minimum.

In closing he stressed the fact that priorities are not an experiment but a necessity. There will be hardships but the system is vital for an effective defense effort.

In response to questions Dr. Pratt pointed out that O.P.M. branch offices can not give out priority ratings but can expedite getting them. He also said that adjustments in ratings can be made at any time so that no company should have difficulty in obtaining raw materials, repair parts, etc., for high-rated work.

One eastern sand producer said his company is being held to about one-fourth of its former fuel-oil supply. This company dries all its product, of which only one size, forming 30 per cent. of the total, is sold for defense work. Others complained of difficulty in obtaining repair parts, supplies and new equipment. Dr. Pratt replied that a new ruling on this problem will soon be made. He also said that with iron

and steel becoming almost entirely defense materials, molding sand may soon be placed in the same category.

V. P. Ahearn, executive secretary of the association, closed this discussion with the warning that transportation priorities may become the most important of any as they were in the last war.

In opening the first meeting President L. M. Hansen discussed the capacity survey made at the request of the National Defense Council which has made the industry realize its importance in that program.

Mr. Ahearn then gave his usual clear and unbiased picture of the Washington scene as it affects the industry with respect to the defense program, price control, jurisdictional labor disputes, etc. He said that labor is in danger of limiting legislation and that priority control of transportation may soon be expected. He advised producers to build up their stocks of fuel, equipment and supplies as they will soon be hard to get. A steady increase in wages paid should be expected as nearly every strike will be settled with a wage increase.

Mr. Ahearn also discussed the growing shortage of skilled labor and its effect on draft policies. If a key man in any organization is called for draft, he advised the producer-employer to appeal to the local draft board as this is a vital industry. He said that the government is determined to do everything necessary to protect this nation, even if it means involvement in the war.

In his discussion of the work of the Research Committee E. O. Schneider said that a report has nearly been completed. He expressed the hope that the association would appropriate funds for research work which up to now has been done almost entirely by users of the industry's products. He stressed particularly the necessity for finding new uses for the industry's materials. Considerable discussion followed and the board of directors was authorized to make a report on this problem at a later meeting.

The board, after due consideration, recommended the re-establishment of the research committee to consider suggestions from members on the most suitable fields for research. In this way a practical plan of research is expected to be developed.

Stanton Walker, the association's consulting engineer, said that the industry is now on common ground with its customers due to the work of the Foundry Sand Committee which was organized three years ago. Tests on the reproducibility of foundry sand were made and a paper on the results was presented at the last convention of the American Foundrymen's Association. These tests, said Mr. Walker, showed a wide spread in the tests made by various laboratories on both bonded and unbonded sands.

The Foundry Sand Committee has made the condensing and simplifying of this paper its principal project for the coming year. This, it is felt, is more important at this time than any further research or tests. It was suggested that further study of the test technique and results might explain the variations. According to Mr. Schneider, the paper is too technical now for the salesmen to use and for the average person to understand. The committee, he said, will also continue to review any papers presented at the foundrymen's meetings.

J. M. Strouss said that, although the industry's capacity is rated at 240 per cent. of 1940 production, it is now confronted with the greatest problem in its history, that of coöperating to the fullest extent in the defense program. The problem, he said, is to be in a position to furnish the necessary quantities of special grades of sand on short notice. He said that the industry is on record with the O.P.M. as able to carry its load and all members should coöperate in the effort to back up this promise.

Mr. Ahearn warned that future demands will far exceed present ones as only 6 billion dollars was spent during this fiscal year out of a total of 45 billions appropriated. He also said that if industry does not make preparations to take care of increased demand, the government may find it necessary to subsidize new production.

After one of the meetings the Whitehead Brothers Company, one of the largest producers of industrial sand, showed a sound motion picture which described the history of this firm since its formation in 1841 and illustrated the operation of its many plants in the east.

One of the highlights of the convention was the picnic held on the night of June 19 at the Cascades near Hot Springs. On the afternoon of June 20 the annual golf tournament was held under ideal weather conditions.

All the officers and directors of the association were unanimously elected to serve another term.

How to Extinguish Incendiary Bombs

Explosives-testing engineers of the Bureau of Mines state that the chief difficulty in attempting to extinguish incendiary bombs is that some of the common fire extinguishing methods may spread the fire rather than put it out.

It is important, the Bureau of Mines declares, that the information relating to the nature of incendiary devices, the suitability of various extinguishing agents and fire-fighting techniques be made available to our Federal and local protective agencies and through them to the general public.

For the protection of our arsenals and factories producing defense materials, the nation's firemen, policemen, plant guards and industrial workers should be informed immediately of the known ways and means of coping with incendiary and explosive bombs and other inflammatory devices which are the favorite weapons of saboteurs, it was stated by Dr. R. R. Sayers, director of the Bureau of Mines, United States Department of the Interior.

"Defense against fire," said Director Sayers, "has become part of our national security."

In a personal report to Secretary of the Interior Harold L. Ickes, Doctor Sayers pointed out that the bureau has been studying the explosibility and inflammability of a wide range of materials used in the construction of incendiary bombs.

Many data already have been gathered by Bureau engineers and chemists through their long experience in the study of metal dusts in plants producing and processing aluminum, zinc, magnesium and other minerals. The bureau also is keeping itself informed on measures used abroad to control and extinguish fires started by incendiary devices.

Prior to our entry into World War I approximately 100 outrages were perpetrated by saboteurs in munitions plants, technical factories and warehouses; and explosions and fires occurred on a large number of ships hauling war materials. Considerable ingenuity was displayed in the design and making of incendiary bombs then, but it is likely that the modern saboteur will be even more effectively armed.

British experience with aerial incendiary bombs offers many clues to the construction of modern fire-setting devices and to the means which may be employed in coping with them. Certain protective measures are at once apparent, and include: a need for increasing the amount of fire-fighting apparatus in the hands of many fire departments; an expansion of training in fire-fighting techniques; the organization and training of private fire brigades, either on a volunteer or pay basis; the proper spacing of new industrial buildings; the increased use of fire-alarm systems and automatic-sprinkler systems; and a general program of education as to the character of incendiary devices.

By W. H. TAYLOR

Land-Pebble Phosphate Deposits of Florida

The first of a series of articles discussing the characteristics of these deposits which are said to be unlike any others in existence

A SMALL area of about 30 square miles comprises the Florida land-pebble phosphate deposits, located approximately half way down the peninsula near the west gulf coast. Roughly there are about 500,000 acres, of which about 20 per cent. contains minable tonnages that can be worked at a profit under the mining methods at present employed. Approximately 60 per cent. of the minable tonnage is located in the western half of Polk County, 30 per cent. in the eastern part of Hillsborough County, and the remaining 10 per cent. in the northern extremities of Manatee and Hardee Counties. The deposits in the last two named counties have never been considered rich enough to be worked, and at present all mining operations are confined to Polk and Hillsborough Counties.

The phosphate pebbles, found embedded in a clay and sand matrix, vary in size from almost microscopic particles to stones as large as a goose egg. The matrix varies, in depth from about 2 to 20 feet, and in richness from 1,000 to 10,000 tons per acre. The overburden ranges in depth from 2 to 3 feet in low places to 50 feet in the higher sections; the average is about 20 feet.

The hard-rock phosphate deposits of Florida north of this area, in Citrus, Levy, Marion and Alachua Counties, should not be confused with the land-pebble deposits. They are of an entirely different nature, and somewhat different methods of mining are employed.

The hard-rock deposits occur mostly in bowlder formation, at some places outcropping and at others more than 50 feet below the ground surface. Although the average grade of hard-rock phosphate is slightly higher than that of land-pebble, it is usually more costly to produce and, consequently, less of it is mined. It has never been a serious competitor of land-pebble phosphate on account of the high cost of production.

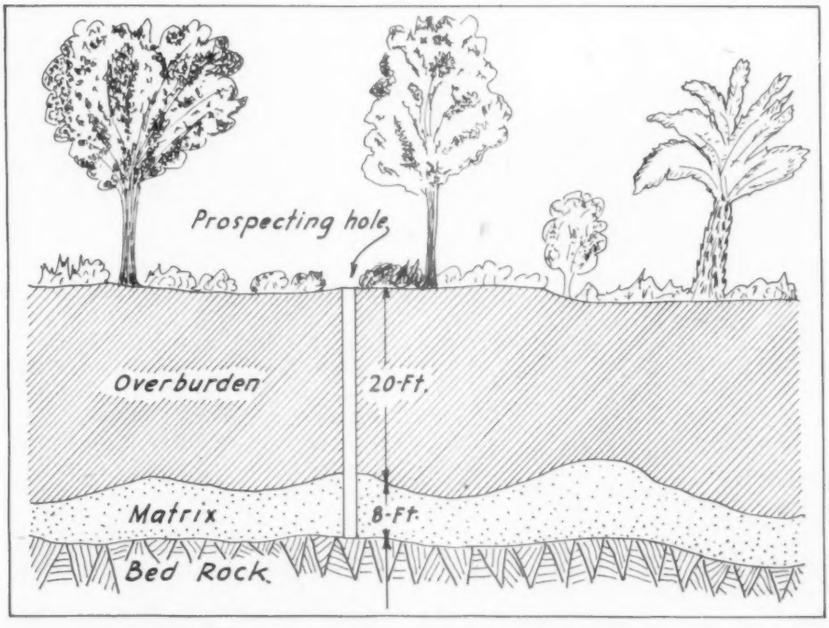
The approximate 100,000 acres of land-pebble phosphate deposits scattered throughout the area contain around 300,000,000 tons of minable phosphate rock, ranging in grade from 66 to 80 per cent. tricalcium phosphate, which is commercially known as bone phosphate of lime. Normally about 3,000,000 tons per is mined in the district each year, so there is enough to last a minimum of one hundred years at the present rate of production.

Post marking the spot where phosphate companies' lands meet in Florida's land-pebble district.

Before the institution of the recovery processes several years ago, only about one-half of the above tonnage figures could be accounted for. The other half was being unaccounted for in the methods of prospecting and lost in the waste dumps from the washing plants. The majority of these dumps are now being re-worked at a considerable profit, and the prospecting data are also being brought up to date by employing new methods of procedure to include the fines, which can now to recovered by the flotation processes. These discoveries have at least doubled the life of the industry, which is an economic fact of vast importance to the nation, as well as the world at large.

Since President Roosevelt's senate committee investigated the potential possibilities of the phosphate output in the land-pebble district of Florida as well as elsewhere in the United States, it has been brought to light that several billion tons is available. This, of course, includes all phosphate-bearing materials composed of extremely low grade and low tonnage deposits, matrix slimes and the bed rock beneath the deposits, which contains a certain amount of tricalcium phosphate. However, up to the present time very little of this has ever been considered minable by the operating companies, who are compelled to make at least a narrow margin of profit in order to stay in business.

The gradual development of the processes by both flotation and electrostatic separations, combined with the blast-furnace methods of reducing me-



Cross-section of a typical pebble-phosphate deposit.

tallic phosphorus, will likely consume all such deposits as time goes on and requirements necessitate such operations. This, of course, will prolong the life of the industry by several hundred additional years, at the present rate of mining and consumption. This fact is of such importance that the senate investigating committee returned to Washington and reported to the President that there would be no necessity of restricting phosphate shipments from this country for a long time to come.

All the land-pebble phosphate deposits of Florida lie within close proximity of the Tampa Bay area, and are considered by most scientists as having been a part of it at one time. This theory is supported by the many remains of marine animals found embedded in the deposits during mining operations. Shark's teeth as large as a man's hand, teeth and vertebrae of numerous fishes, whales' teeth, manatee

Face of extremely rich matrix (30 per cent. pebbles). Bunch of keys stuck in bank shows relative size of pebbles.

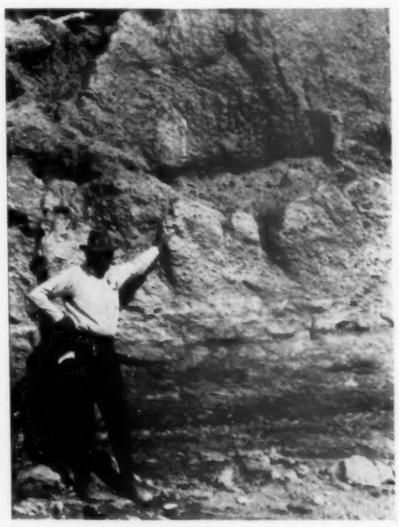
skeletons, coral fragments, sea shells, and many other remains of prehistoric denizens of the sea are found throughout the area.

However, complications are immediately injected into the theory of this fantastic picture, because of the fact that remains of prehistoric land dwellers are also found in these deposits. Huge mastadon jaw bones with molars intact, mammoth tusks more than ten feet long, teeth of the saber-toothed tiger, and many other unidentified land-animal remains are found deposited in the same places with the marine-life fossils. This face instantly fires one's imagination as to just how such strange phenomena could have occurred at some age in the distant past. Many theories have been expounded, and in most cases one is about as good as another. The lack of concrete evidence will likely always leave doubt as to the facts of the case.

It is probable that this part of Tampa Bay was comprised of enormous shallows, in which luxuriant vegetation grew to huge proportions. The land animals possibly waded out to feed upon them, followed by the preying flesh eaters, while the sharks and other marine Carnivora invaded the shallow waters in search of smaller fish to feed upon. During this time a sudden upheaval, possibly caused by an earthquake and followed by a tidal wave, suddenly rushed in with terrific force and covered them all together in a common grave, now known as the land-pebble phosphate deposits of Florida.

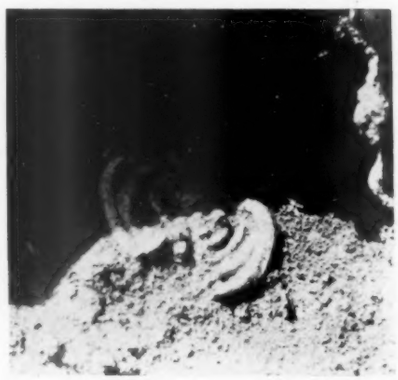
Petrified fragments of coarse-grained soft wood are also found in these deposits, possibly indicating the presence of the fast-growing tree ferns and other vegetation of the carboniferous age. This fact further supports the theory of the presence of vegetable matter upon which the mammoths and other land animals likely fed.

The finding of manatee skeletal remains in these phosphate deposits has brought to light one of the most remarkable facts of natural history. This is positive proof that this present-day animal is a descendant of a prehistoric ancestor. Manatee skeletal remains are even found in the bed rock several feet below the phosphate deposits, which is further evidence that these animals existed long before the deposits were made. The manatee is a vegetarian, feeding almost exclusively upon sea grass, and is commonly known as the sea cow. It is a mammal belonging to the bovine family, and is possibly the forerunner of our present-day cow, which, due to conditions existing at some period of history, crawled out on land and evolved through the centuries into its present form. The present-day manatee is rare and, according to students of natural history, is fast becoming extinct. It is one of the last animals of another age to hold out against a so-called civilized world.



Face of a lean deposit. This 10-foot bank contains only about 10 per cent. pebbles.

The phosphate pebbles, in practically all cases, show distinctive signs of erosion, which is proof that they were washed in from some other area by a tidal wave or terrific disturbance of some nature. They were likely pebbles of calcium carbonate, commonly called limestone, and after coming in contact with an enormous amount of decaying animal and vegetable matter, under a



Face of deposit showing skeleton of prehistoric animal embedded in matrix.

certain amount of pressure and heat, the carbonates were replaced by phosphates through a chemical change and a gradual process of leaching throughout the ages. Likely the richer the locality in organic matter, the higher the grade of phosphate in the pebbles, or the more the carbonates were replaced by phosphates contained in the organic matter. One of the most common impurities found in phosphate rock is calcium carbonate. When land-pebble phosphate rock is heated to about 2,000 degrees F., generally a fishy-smelling volatile gas, which resembles the odor of ichthyol, is driven off. This is further evidence of its marine origin or association with ocean life.

There are eight mining companies operating in the land-pebble phosphate district of Florida, which own the majority of properties upon which phosphate has been found. They are: American Agricultural Chemical Company, Amalgamated Phosphate Company, Coronet Phosphate Company, International Agricultural Corporation, Pembroke Chemical Company, Phosphate Mining Company, and Swift & Company. The Virginia-Carolina Chemical Company, Armour & Company and F. S. Royster Company also own some valuable deposits, but are not engaged in the mining business at the present time. A small portion of these lands is still in the hands of private ownership, but will likely be bought up the mining companies.

The 3,000,000 tons of phosphate normally mined each year is sold for ap-

proximately $10,000,000. There are about 2,000 workers actively engaged in this business, to whom around $2,000,000 is paid annually for wages.

The majority of these workers have families and live in company-owned houses at the mines. Each operating company maintains an up-to-date village for its workers. The balmy sunshine and warm gulf breezes produce a subtropical climate in which the temperature never reaches extremes. The atmosphere is humid and sunstrokes are unknown. Green lawns, decorated with beautiful shrubbery and flowers, are kept growing throughout the year.

All the mines are located within short distances of good towns, including Tampa, Plant City, Lakeland, Bartow, Mulberry, Fort Meade and Wauchula. However, some of the mines maintain schools, churches, hospitals and stores to take care of their employees' needs. Others depend upon the adjacent towns, which are near and can easily be reached within a few minutes by automobile.

The eight operating companies in the district consume more than 100,000,000 kilowatt-hours of electrical energy per year under normal operating conditions. The Tampa Electric Company of Tampa, Florida, supplies better than 60,000,000, the Florida Public Service Company of Orlando, Florida, something more than 20,000,000, and an additional minimum of 20,000,000 kilowatt-hours is generated by some of the phosphate companies who own up-to-date power stations. This represents a yearly expenditure of about $1,000,000 for power alone by the mining companies in the pebble-phosphate district of Florida. The power cost per ton of production averages about 35 kilowatt-hours.

(To be continued)

Loading Spring Holes Mechanically

By PAUL ZIEMKE

THE work of springing bank holes is steadily gaining in favor with open-pit and quarry operators in their endeavor to eliminate unnecessary drilling and to concentrate charges in positions where they produce the most efficient results.

Once these "sprung" cavities have been developed, some difficulty exists in loading horizontal holes as compared to the simple expedient of pouring bulk explosives down a vertical hole. To expedite horizontal loading a simple and effective device can be quite easily constructed to accomplish this work.

While some slight hazard from static electricity may develop due to air and powder friction, this can be remedied by grounding the apparatus to a proved ground rod or line.

Bulk ammonia dynamites may be successfully loaded into flat drill or toe holes by means of compressed air blown through a 1½-inch copper tube. By this means it is a comparatively easy matter to load a 25-foot hole with a tube 18 to 20 feet in length which will readily fill the chamber at the extremity of the hole.

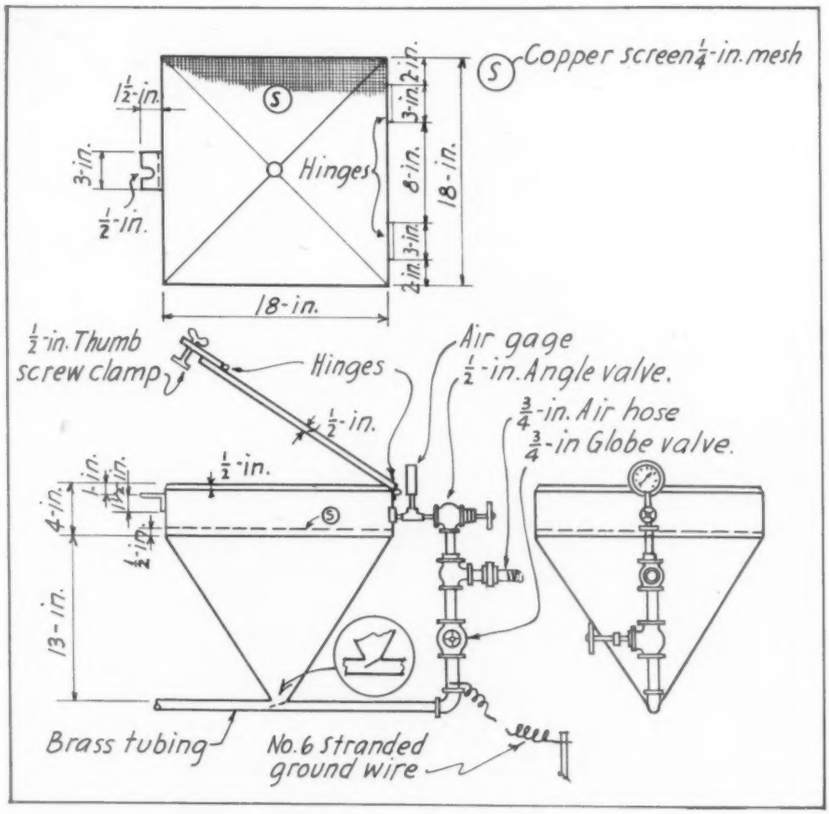
A 12-foot section of ⅜-inch iron pipe is inserted in the copper tube and a light blast of air turned on, the resulting suction draws in the explosive and deposits it tightly in the chamber. The dissipated air flows out through the numerous fissures developed by the springing. The expulsion of air about the copper tube's outer end indicates that the chamber is full and all the fissures closed.

In ground that does not develop fissures or vents to the atmosphere during the springing operations a more versatile and highly developed machine is illustrated herewith. The operation of the machine is simple as is also the construction. Fifty pounds of bulk or bag powder is poured through the screen and into the hopper, then the cover is clamped down. Now a little air is turned on by means of the upper angle valve and pressure gage which serves to maintain a downward pressure on the powder. With this accomplished the lower valve is opened and a stream of air is forced into the sprung hole, carrying with it the explosive drawn down through the opening in the bottom of the hopper by vacuum and by the air pressure exerted from above.

Operators soon become very adept in sensing the extent of the load present by the "feel" and sound of the air passing into the void. In those rare instances where the void inadvertently becomes overloaded the condition is at once noticeable by the hissing of air blowing by the discharge tube. Two experienced men easily load 50 pounds of powder in from 5 to 8 minutes with little physical effort and no added hazard. And last, but by no means least, the men enjoy the freedom from "powder" headaches.

The Erie Materials Company, Fort Wayne, Indiana, is remodeling the asphalt plant purchased recently from the Erie Stone Company,

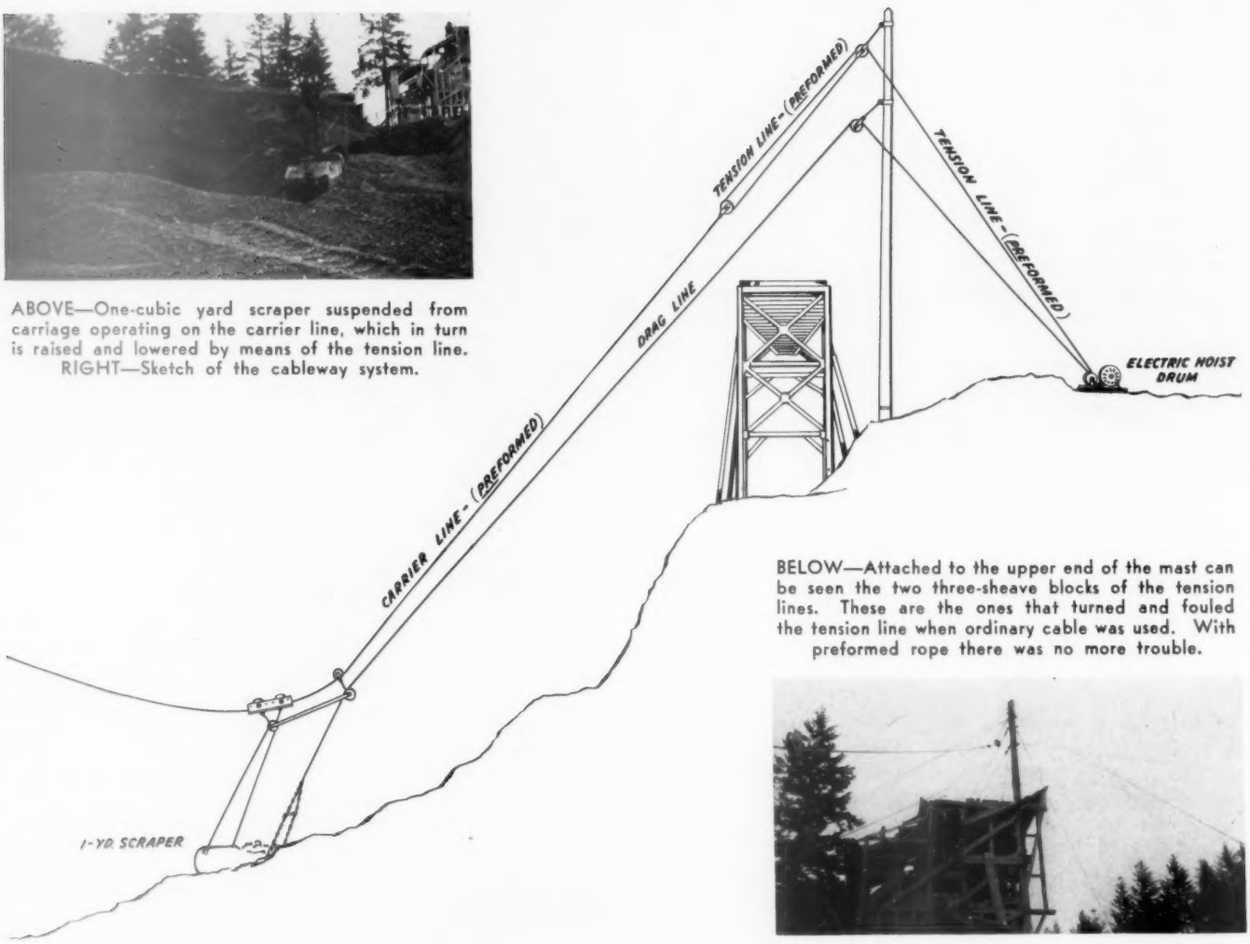
The company will install all new equipment at cost of about $90,000.



Sketch of device for loading horizontal holes.

Cable Performance at a Gravel Plant

ABOVE—One-cubic yard scraper suspended from carriage operating on the carrier line, which in turn is raised and lowered by means of the tension line.
RIGHT—Sketch of the cableway system.



BELOW—Attached to the upper end of the mast can be seen the two three-sheave blocks of the tension lines. These are the ones that turned and fouled the tension line when ordinary cable was used. With preformed rope there was no more trouble.

IN small gravel plants operators encounter problems in operation and maintenance that are just as serious in proportion as those met in larger and more elaborate plants. One of these problems has to do with the wire rope used in operating the drag-line scraper, a system frequently employed. The road department of Clark County, Washington, had such a problem in connection with its gravel plant at English Pit. The county operates four gravel plants and three ledge-rock plants located at strategic points to give shortest-haul service to the county's network of roads. The roads in this county total 809.42 miles, exclusive of state roads. The county roads are divided as follows: unimproved, 53.67 miles; graveled and drained, but not surfaced, 22.14 miles; stone-surfaced, 571.37 miles; low-type bituminous surface, 137.79 miles; high-type bituminous surface, 10.14 miles; cement concrete, 14.31 miles All these highways come under the supervision of Charles Deako, county road engineer, with headquarters in Vancouver, Washington.

The gravel plants are not operated continuously, producing only when and as required for work on those sections of the road system which they are designed to serve. The same men who operate the gravel plants also do road work in various capacities, so that they are given practically continuous employment. In the plant under consideration, W. C. Schoenig is plant operator and R. G. Tuttle, hoist operator. Outside storage capacity is provided, so that the plant may be operating to lay up reserves at times when weather or other conditions may interfere with road work in that area. Or, if road work is going on and requiring gravel beyond the storage capacity, the plant may be operated simultaneously, and the trucks load directly from the small bin storage.

The major equipment consists of one Traylor 6-inch finishing crusher, one Telsmith vibrating screen, ⅞-inch minimum, an elevating conveyor and an overhead cableway system for excavating with a 1-cubic yard drag-line scraper. The pit at points has been excavated to a depth of approximately 150 feet. In average operation at the present working level about a 1-minute cycle of the scraper is maintained; in other words, a production of 50 to 60 cubic yards per hour.

The excavating system employed consists of a carrier line anchored at the far side of the pit, the other end being attached to a mast over the crusher plant. This connection is made through the intermediary of a tension line operating on 3-sheave pulleys. From there the tension line leads down to the hoist drum. Winding up on the tension line draws on the end of the carrier line and raises it from a steep dip down into the pit to a more nearly horizontal position after the scraper has been filled by means of the drag-line. The scraper is suspended from a carriage on the carrier line and when loaded is pulled in by the drag-line, on the second drum of the hoist, after the carrier line has been raised.

"It was with the tension line that we had the most trouble in the beginning," Mr. Schoenig explained. "We

(Continued on page 108)

Veteran Iowa Builder Locates Gravel Plant Near Fort Dodge

This view shows the 1-cubic yard gasoline drag-line, the truck-loading hopper, and the trucks which haul the gravel to the plant.

IN traveling about the country one often wonders how the various industries observed got their start. Undoubtedly most of them have an interesting history but in most cases it never gets into print. The history of the Paul Concrete Material Company of Fort Dodge, Iowa, is actually the history of Dick Paul, owner of the company. Mr. Paul has been a road contractor for 22 years, operating as the Paul Construction Company, building asphalt and gravel roads, but not concrete. During this period he has operated a number of portable sand-and-gravel plants to supply the materials for these contracts. For this purpose he now operates a 12-year-old Pioneer portable plant and a 3-year-old Diamond portable plant.

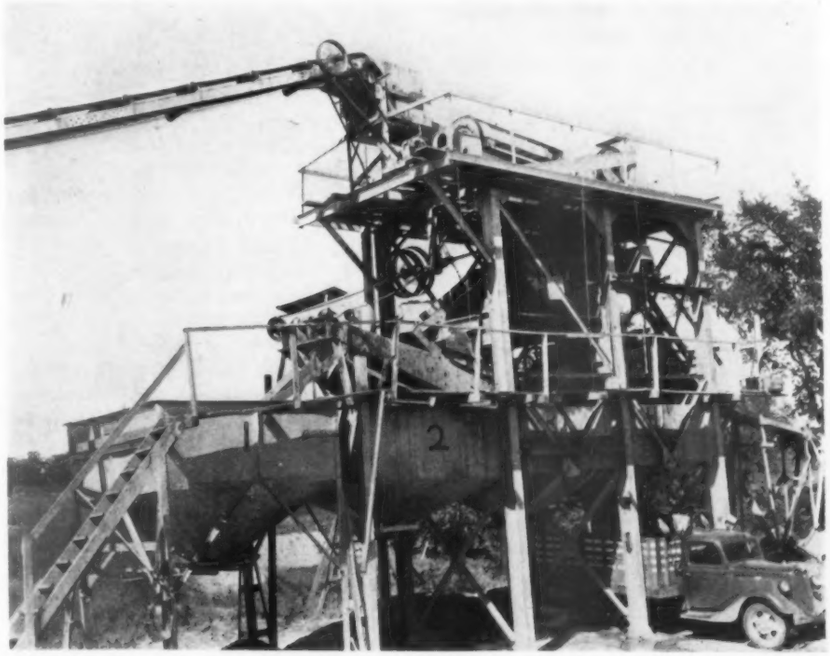
In October 1939 Mr. Paul with two partners put in operation a 40-ton per hour Diamond Iron Works semi-portable plant 3 miles west of Fort Dodge, Iowa. The company was known as the Deep Rock Sand & Gravel Company. At the same time batching equipment was installed for loading truck-mixers and this part of the business was known as the Transit Ready-Mixed Concrete Company. On August 12, 1940 Mr. Paul bought out his partners and adopted the present company name. He plans to install equipment for the manufacture of concrete blocks and drain tiles in order to use up some of the excess sand and pea gravel produced by the new plant.

The 300-acre deposit averages about 30 feet in depth. It consists of about 35 per cent. gravel of which little is over 1½ inches in size. The top 10 feet of gravel in the pit is the red gravel common to this section and under it is a 4-foot bed of clay. At first only this red gravel was excavated, but later it was accidentally discovered that under it is an 18-foot bed of white river gravel which is rare in this section and which can be sold at a higher price.

The overburden averages about 3 feet in depth and this and the clay are removed by the same 1-cubic yard P&H gasoline drag-line which loads gravel and by a Caterpillar tractor and rotary scraper. The drag-line loads material into an Iowa hopper over which is a vibrating screen which scalps out any plus- 1½-inch gravel. It is now planned to install a crusher in the plant to reduce oversize gravel.

The gasoline drag-line is again shown, this time removing overburden from the deposit.

Trucks are loaded under the hopper and haul the material to the plant, a distance of a few thousand feet. Four Ford bottom-dump trucks are used which also double as delivery trucks. The material is dumped into a hopper from which a reciprocating feeder discharges it on a 110-foot belt-conveyor running to the top of the plant. The



This view of the plant shows the main conveyor, the revolving scrubber, the sizing screen and the sand screws. The truck being loaded under the bins is not the type ordinarily used for gravel haulage.

material first goes through a Diamond revolving scrubber which is followed by a 3-deck Diamond vibrating screen. The sand goes to a drag dewaterer from which it is discharged into a bin. The pea gravel passing over the bottom deck of the screen also goes into a bin. The two coarse sizes of gravel from the screen go to a pair of Eagle washers and deshalers from which they are discharged into bins. Trucks are loaded under the four 21-cubic yard steel bins. All shipments are weighed on an American truck scale. Most deliveries are made within a radius of 40 miles. A fleet of four end-dump trucks is operated.

The plant is completely electrified.

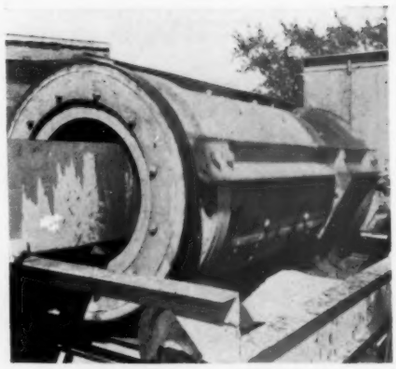
The screw washers and deshalers from which the gravel is discharged into loading bins.

Water for washing is supplied by two 6-inch Gould pumps which move the water a distance of 700 feet with a lift of 68 feet.

The concrete-batching plant is near the aggregate plant and sand and gravel are brought from the plant bins in trucks. These discharge the aggregates

The 3-deck vibrating screen which does all of the sizing in this plant.

into a hopper from which a Diamond belt-conveyor feeds them into a 35-ton, 2-compartment bin. A Blaw-Knox 2-cubic yard batcher is used for the sand and gravel and cement is added from sacks. Water is measured from a 1,000-gallon tank into the truck mixer tank. Two 2-cubic yard Blaw-Knox truck-



The revolving scrubber which is the first step in removing clay and shale.

mixers mounted on International chassis are used.

Deliveries of concrete have been made as far as 30 miles but most of it goes to Fort Dodge. In July concrete was supplied for ¾ mile of concrete road at Lehigh, Iowa. This is believed to be the first time ready-mixed concrete was used for a state highway in Iowa.

Wire Rope

(from page 106)

were using ordinary wire rope on that line. The two pulley blocks, each with a 12-inch sheave, are fairly heavy. There was enough spring in the wire rope to keep the blocks continually twisting and turning out of the same plane. Sometimes they would turn completely over in opposite directions. The result was that we were continually fouling the tension line and having to stop and straighten the blocks. This was exasperating and wasted a lot of time. There undoubtedly could be some way devised to anchor or weight the blocks so that they would not twist out of line, but this would be a more or less complicated matter and we decided instead to try preformed rope on the tension line. This was done, using a ¾-inch, 6 by 19 preformed rope. Since then we have had no trouble from fouling of the tension line.

"Having had such success with preformed rope on the tension line, we decided to give it a trial on the carrier line. Ordinary wire rope is used generally for that purpose and is thought to be good enough, since there is no excessively sharp bending and no running over sheaves. Nevertheless, we gave the preformed a chance to prove itself here and in 1939 put on a Langlay, preformed rope, 7 by 19, 1¼ inches in diameter. There is approximately 500 feet of it.

"The results have been really astonishing. Our records show that previously, when using ordinary wire rope, we could get from 7,000 to 8,000 cubic yards output from a carrier line. With this first preformed rope we have already excavated close to 50,000 cubic yards and there seems still to be plenty of life left in it.

"This seems to be almost unexplainable, since there are no different conditions encountered in working in different parts of the pit. I can lay the unusual accomplishment to only two factors: (1) we know from the manner in which this type of rope is manufactured that the internal movements of the strands are greatly reduced, reducing the wear from friction of one wire moving over another and also the amount of bending of the strands back and forth, and fatigue of the metal does not occur nearly so quickly. While there are no sharp bends in the carrier line such as turning over pulleys, it does run down into the pit in a rather sharp loop and is then straightened out again under severe tension at every cycle. This is fatiguing to the rope. (2) The lay of the strands is much more nearly parallel to the length of the rope than in the rope we had previously been using for the carrier. The carriage wheels seem to operate more smoothly on the present rope and there appears to be less surface wear than is the case with a rope where the strands have a steeper pitch. It is like running the wheels along the rails of a track instead of across the ties."

An Open Letter

To W. R. Cliffe:

Congratulations! Your article in the June issue of PIT AND QUARRY on *Rotary Lime Kiln Operating Technique* was an excellent contribution to rotary lime-plant engineering and deserves widespread recognition as such.

To the National Lime Association:

You deserve the thanks of the nation for presenting such a timely subject as the above at your annual meeting. May it develop into a real contribution to National Defense and provide post-war benefits for all.

To Pit and Quarry:

Fuel uselessly burned is gone for all time. We are wasting one of our most important national assets. Such waste of material involves a waste of labor. It is a waste of our wealth. It lowers the standard of living for everyone.

May we all join in an effort to terminate the building of monuments to inefficiency. There is a real need for development in the field of lime-plant engineering. The capacity of the average rotary lime kiln can be doubled; its efficiency can be doubled; doubled output can be had with no increase in fuel consumption.

Mr. Cliffe by his article on *Rotary Lime Kiln Operating Technique* has started something.

Let us all help him to finish the job.

THERON C. TAYLER.

PERSONAL MENTION

PAUL J. KREMER, credit manager of the Buffalo Slag Company, has been elected chairman of the Building Trades Credit Group of the Credit Men's Association of Western New York.

BENJAMIN P. CURTIS has been appointed head of the basic-slag division, Tennessee Coal, Iron & Railroad Co., Birmingham. He succeeds the late S. D. Nance.

DR. C. F. RASSWEILER has been appointed director of research of the Johns-Manville Corporation. He had been director of the Philadelphia laboratory of E. I. duPont de Nemours Company.

CHARLES J. HEIST, former sales manager and service engineer in the Youngstown area for Standard Lime & Stone Company of Baltimore, has been appointed general superintendent of the Hanna Furnace Corporation in Buffalo.

ROGER MONROE, chemist in the laboratory of the Huron Portland Cement Company at Alpena, Michigan, was married on June 4 to Miss Doris Pung of Lansing, Michigan.

WILLIAM B. HARTSFIELD, president of the Southern Talc Corporation and former mayor of Atlanta, Georgia was honored recently for his contribution to the historical interests of Atlanta by that city's historical society.

L. J. LYNCH is the new Detroit representative of the Morris Machine Works, Baldwinsville, New York. His office is in the Kales Building.

GLENN E. HESS, associated with his father in the Concho Sand & Gravel Company, Oklahoma City, was married June 25 to Miss Jo Ellen Kennedy of Clarendon, Texas.

A. P. WRIGHT, of Wichita, Kansas has selected the mortarless-masonry system of reinforced-concrete construction for his new plant in Wichita and has installed Mortarless concrete-block machines for the production of the units.

ROSCOE C. HOPKINS, former city purchasing agent of Kansas City, Missouri, has been made assistant to Robert P. Lyons, vice-president and general manager of the Ready Mixed Concrete Company of Kansas City.

How Would You Grip Wire Rope?

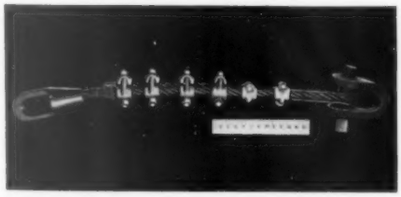
FINGER PINCH...?

Cuthbert can't do any better. The U-Bolt Clip he uses crimps and spoils the rope, causes delays and dangerous accidents. Would you hire Cuthbert to do a man-sized job?

OR FIST GRIP...!

"Here's the way to grip wire rope," says the Man On The Job. With a real fist grip! No delays, spoiled rope or accidents! It costs less to use Laughlin Safety Clips!"

CLIPS HOLD AT 88 TONS LOAD



Dramatic, competitive tests. A world-famous laboratory, a U. S. Government arsenal, and a leading wire-rope manufacturer tested the Laughlin drop-forged Safety Clip. They found it twice as strong —delivering over 95% of rope strength. An assembly of six Safety Clips held 88 tons load! Result: *fewer clips needed.*

THIS FREE FOLDER DESCRIBES THE TESTS

and proves money-saving features like these

SAVES TIME Bolts on opposite sides. Can't be put on backwards. Easy to apply, tighten and remove. Fewer delays from rope breaks.

SAVES ROPE Flat bearing surfaces grab strands and stay put without unlaying them.

WRITE US TODAY USING THIS COUPON

THE THOMAS LAUGHLIN CO.
PORTLAND, MAINE

Please send me free Safety Clip booklet, Q-6

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COMPANY .....

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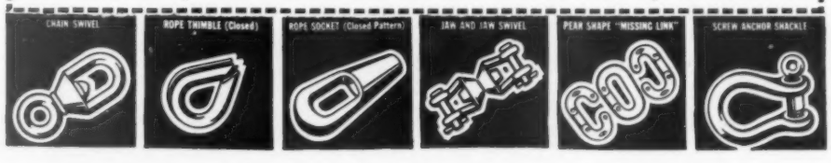
Look for Laughlin products in Pit & Quarry Handbook and buy through your distributor.



Roy Snow

Roy Snow has been appointed general manager of the Utah Sand & Gravel Products Corporation of Salt Lake City. He has been with the concern since 1923 and an officer of its affiliates, the Stauffer Sand & Gravel Company and the Utah Lime & Stone Company, also in recent years. Eric Ryberg, president, formerly served also as general manager but his new duties as vice-president of the Utah-Idaho Sugar Company are now taking up the major portion of his time.

A. J. Grindle, well-known pulverizer engineer, has re-joined the Whiting Corporation, Harvey, Illinois. Mr. Grindle has had extensive experience in the design and operation of equipment for pulverizing fuels and other materials for various purposes. For the past several years he was engaged in consulting practice.

W. R. Bendy, cement engineer of Claverack, New York, is in Venezuela investigating a cement-plant project.

C. Russell Arms is opening a new concrete-products plant at Brookings, South Dakota.

M. G. Dickson of Baxter Springs, Kansas, and G. I. Hoffman of Miami, Oklahoma, have taken over the plant of the Miami Rock Products Company, and now are operating it under the name of the H & D Sand Company.

Harry Buckenheu has been appointed New York district manager of the Smith Engineering Works, Milwaukee. He is located at 50 East 42nd Street and will cover all of New York state and southern Connecticut.

A. W. Parker is retiring from active service with the Worthington Pump and Machinery Corporation, after 54 years of continuous service. Recently he had been doing publicity work for the company.

Melvin H. Baker, president of the National Gypsum Company, received an embossed scroll in recognition of his work as president of the Buffalo Chamber of Commerce at the Chamber's annual election of officers recently. Mr. Baker served as president for the past two years.

O. J. Ellertson, Pioneer Engineering Works, and D. D. Knowles, Diamond Iron Works, have been named vice-president and secretary, respectively, of the recently-formed Twin Cities Industrial Advertisers group composed of St. Paul and Minneapolis concerns.

Laurence M. Ewell has been appointed general manager of eastern division operations of Link-Belt Company with headquarters in Philadelphia.

A. W. Thomas and D. A. Kalton have been appointed as assistants to the sales manager of the Construction Equipment Division of the Chain Belt Company, Milwaukee.

William Moody, 65, superintendent of the Rock Island Sand & Gravel Company, died after a two-months' illness at his home in Rock Island, Illinois, recently.

John Dolese, president of Dolese Brothers Company, crushed-stone, producer of Chicago, died in his home at Evanston, Illinois, a short time ago. Surviving are his widow, and a daughter.

George William Menke, 82, president of the F. W. Menke Stone & Lime Company and prominent in business and civic affairs of Quincy, Illinois, for half a century, died at the wheel of his automobile recently after a heart attack.

Michael McDonough, 72, one of the first contractors in Massachusetts to use macadam in the construction of highways and owner of the Malden Crushed Stone Company passed away a few weeks ago.

Harry C. Stevens, 46, superintendent of the Standard Portland Cement Company, Painesville, Ohio, died recently. He joined the company in July, 1925 as a foreman during the construction of the plant. Shortly after he was made assistant superintendent, and in 1935 was made superintendent. His early life was spent in cement mills in the Hudson, New York, District.

Lewis A. Rice, 70, engineer and salesman traveling out of the home office of the Traylor Engineering & Manufacturing Company, Allentown, Pennsylvania, died on June 4 at the Allentown Hospital after about a week's illness. He had been with the company for upwards of thirty years and was one of the oldest employees.

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THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength*, was wiped out when Taylor Forge pioneered spiral pipe.

That spiral seam makes it possible to produce a pipe that is light walled and therefore less expensive to buy, ship, and use—yet strong in every way, thanks to the spiral reinforcement which stiffens it from end to end—holds it round and true against collapsing strains—gives it bursting strength even beyond that of a seamless tube of equal gauge.

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ASK FOR CATALOG 36

OCCUPATIONAL DISEASES and the LAW

Disability

Smith v. Wilson Foundry & Machine Company, decided by the Supreme Court of Michigan, March 11, 1941; reported at 296 N. W. (2d) 654.

A medical commission appointed as provided in the Michigan Workmen's Compensation Law reported that the claimant involved in this suit was not suffering (when examined) from dermatitis venenata, an occupational disease. The Department of Labor and Industry remanded the claim to a deputy commissioner for the purpose of taking testimony to determine whether or not the claimant had suffered disablement from the disease due to causes and conditions characteristic of and peculiar to his employment, prior to the examination by the medical commission, and whether or not he was entitled to compensation therefor. The Court, in this appeal by the employer, holds that that action by the Department was correct; otherwise, "an injured employee cannot have a determination of the period of his disability if the medical commission subsequently finds that he is not suffering from an occupational disease," which would deprive employees of rights granted by the Compensation Law.

Ventilation

Weydig v. Cole Electric Products, Inc., decided by the New York Supreme Court, Special Term, Queens County, February 11, 1941; reported at 25 N. Y. S. (2d) 863.

The plaintiff seeks to recover for personal injuries which he claims he sustained as a result of the failure of his employer, the defendant, to construct and equip its factory with certain ventilating and suction equipment, in violation of Sections 200 and 299 of the New York Labor Law. The Court rules that the fact that the employer had (at the time of plaintiff's employment) complied with the Workmen's Compensation Law and secured the payment of compensation to employees and their dependents does not bar this action, inasmuch as plaintiff's claim was presented to the Department of Labor, Division of Workmen's Compensation, and disallowed upon the ground that "claimant does not suffer from an occupational disease under the Law."

"In other words," says the Court, "the Division of Workmen's Compensation refused to take jurisdiction because the Workmen's Compensation Law made no provision for the type of injury suffered by the plaintiff. Under these circumstances, it cannot be said that the plaintiff's remedy is exclusively under the Workmen's Compensation Law. To hold that it is would deprive the plaintiff of any remedy whatsoever."

Contributing Factor

Kail v. Field Pontiac-Cadillac Company et al., decided by the Supreme Court of Michigan, March 11, 1941; reported at 296 N. W. 717.

The Michigan Department of Labor and Industry decided that exposure to carbon monoxide gas in the course of the employment of a worker whose widow brought the claim involved here was a contributing factor in the worker's death due to cardiac failure. Compensation was awarded, but the Court in this appeal remands the case to the Department to make further findings,

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since "under the finding made by the commission, it was the duty of the commission to determine the proportion which the said occupational disease, as a causative factor, bore to all the causes" of the worker's death and, hence, proportion the compensation as provided by the statute (the "proportional disease" provision, Section 8 of Part 7, Act No. 61, Public Acts of 1937). The commission did not make such a finding concerning proportionate liability, which the Court holds is necessary in order to comply with the statute.

Partial Disability

Powers v. Porcelain Insulator Corp., decided by the New York Court of Appeals, March 6, 1941; reported at 285 N. Y. 54.

This is a suit at common law in which an employee seeks to recover damages for alleged *partial* disability from silicosis or other dust disease caused by the alleged negligence of the employer. The trial court (the Supreme Court, Livingston County, Special Term) dismissed the complaint on the ground that as the law now stands in New York, Sections 66 and 72 of the Workmen's Compensation Law (Consolidated Laws, Chapter 67) not only deny compensation under the Workmen's Compensation Law but also bar a recovery for damages in an action at common law where a claim is made for *partial* disability due to silicosis.

The case was appealed directly to the Court of Appeals on the ground that the statute is unconstitutional. The Court of Appeals, however, rules that it has no jurisdiction, since "the question first to be determined is whether the right to recover in an action at common law still remains available," and the Court of Appeals cannot decide that question (or any question except constitutionality) in a direct appeal of this kind; consequently, the appeal is dismissed.

TRADE NOTES

The Stulz-Sickles Company, Newark, maker of Manganal, announces the following new distributors: Baum Iron Company, Omaha; James C. Dawes Company, Martins Ferry, Ohio; Faeth Company, Kansas City; Kacena Company, Cedar Rapids, Iowa; New York Welding Supply Company, New York; Sioux City Iron Company, Sioux City, Iowa; Velde, Roelfs & Company, Pekin, Illinois.

Morris Machine Works, Baldwinsville, New York, manufacturers of centrifugal pumps, hydraulic dredges and steam engines, announces the appointment of H. J. Lynch as representative in the Detroit district. Mr. Lynch is located in the Kales Building.

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LABOR DECISIONS

Truck-Mixers

United States v. Carrozzo et al., decided by the U. S. District Court, Northern District of Illinois, Eastern Division, February 4, 1941; reported at 37 Fed. Supp. 191.

This was a criminal action charging various labor leaders and labor unions with conspiring to prevent the sale and use of truck-mixers in the Chicago area, in violation of the Sherman Anti-Trust Act (the case has been previously discussed in the news columns of PIT AND QUARRY). The overt acts charged were related to the demand of the unions that contractors who used truck-mixers employ as many men as if such mixers were not used. The court ruled that the activities complained of are "within the legitimate objects of a labor union," growing out of a "jurisdictional labor dispute" between labor unions, and that the defendants are immune from prosecution under the Sherman Act. There was no restraint charged "which would be calculated to restrict production of truck-mixers or in any way control the market." The demurrers to the indictment, on these grounds, were sustained.

Manner of Payment

A. H. Belo Corp. v. Street, et al., and *Fleming v. A. H. Belo Corp.*, decided by the U. S. District Court, Northern District of Texas, Dallas Division, February 4, 1941; reported at 36 Fed. Supp. 907.

In one of these suits the Administrator of the Wage and Hour Division asked for an injunction against the employer's continuing its manner of paying and complying with the Wage-Hour Act. The injunction is denied on the ground that the wages paid are above the minimum wages specified in the Act, and "while Congress struck down the right of an employee to contract for less than a minimum wage, it did not strike down the right of the employee and employer to contract with reference to the wages which are in excess of minimum wages."

The other suit was on a petition by the employer for a declaratory judgment. The defendant Street is regional director, and the Court holds that he could appear in his capacity as a private citizen to represent complaining employees under the Act, but that at least one complaining employee must be disclosed to the Court. A proceeding by the Government without disclosing a complaint as the ground of its activity cannot be approved.

Jurisdiction

Doyle v. Johnson Bros., Inc., decided by the City Court of New York, Kings County, February 6, 1941; reported at 25 N. Y. S. (2d) 603.

In this suit, brought by a former employee under the Fair Labor Standards Act of 1938, the defendant employer moved to dismiss the complaint on the ground that it fails to allege facts showing that the employer is engaged in interstate commerce and to plead that the worker was employed in the production of goods for interstate commerce. The authorities relied upon, however, were all Federal cases, in which these allegations are required in the Federal courts for the purpose of obtaining jurisdiction. The court holds, therefore, that they do not apply in this suit in a state court, and the motion is denied.

Subpoena

Cudahy Packing Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Tenth Circuit, January 21, 1941, rehearing denied March 14, 1941; reported at 117 Fed. (2d) 692.

The National Labor Relations Board obtained from the District Court an order compelling the employer named in this case to obey a subpoena for the production of certain payroll and employment data. That order is affirmed in this appeal over various objections of the employer. The only limitation upon the power of the Board to compel the production of documentary or oral evidence is that it must relate to or touch the matter under investigation or in question, says the Court. "When an application is filed with a district court for an order requiring obedience to a subpoena it may inquire only to ascertain that a proceeding is pending before the Board of which it has jurisdiction and that the evidence sought relates to or touches the matter under investigation. If these facts are found to exist, it is the duty of the Court to order obedience to the subpoena." Defenses to the charge under investigation may not be asserted as defenses in a proceeding to enforce obedience to a subpoena.

Bargaining

Southeast Furniture Company v. Industrial Commission, decided by the Supreme Court of Utah, March 14, 1941; reported at 111 Pac. (2d) 153.

The Industrial Commission of Utah, functioning as the Utah Labor Relations Board under Chapter 55, Laws of Utah 1937, certified a local union to be the appropriate unit for collective bargaining with the employer concerned here, and "ordered and directed" the employer "without further delay to enter into negotiations for the purpose of collective bargaining with said local union." The Court holds that such an order was beyond the authority of the Board and void, since a "cease and desist" order may be issued only after charges of unfair labor practices have been made, heard and determined as provided in the statute; the Board had no authority to take a short-cut and order the employer to "enter into negotiations" simultaneously with its certification of a bargaining agent. Furthermore, in accordance with decisions under the National Labor Relations Act, to which the Utah law is similar, it is held that the certification of a union as a bargaining agent is not a "final order" subject to review by the courts.

Employers' Association

The Association of Plumbing and Heating Contractors of Greater New York, Inc., v. Merten, decided by the Appellate Division of the New York Supreme Court, March 21, 1941; reported at 261 App. Div. 543, 26 N. Y. S. (2d) 72.

In this suit an association of employers sought to collect a $500 fine from one of its members for the breach of a contract. The association had a contract with a union representing members' employees. Shortly before that contract expired, the members of the association signed a contract that no member should sign an individual agreement with the union, and that no member should employ a union man during a strike or lockout without the permission of the association. When the union contract expired, the union insisted on dealing directly with individual employers and, after a strike in his plant, the defendant made an individual contract for rehiring his striking employees, in violation of his contract with the association.

The Court rules that an employer's agreement to abstain from negotiating with the union except through the agency of the association does not constitute a violation of the New York State Labor Relations Act; so long as the association as agent "performs the duty with which the employer is charged by law (Labor Relations Act, Section 704, Subdivision 6) to bargain fairly with representatives of employees, neither employees nor their representatives have reason to complain." However, it is held that the prohibition against employment, during a strike or lockout, of a union member, constitutes a discrimination in violation of the Labor Relations Act (Section 701, subdivision 3; Section 703; Section 704, subdivisions 5 and 10), and renders the contract unenforcible. The association, consequently, cannot recover the penalty provided in the contract for breach thereof.

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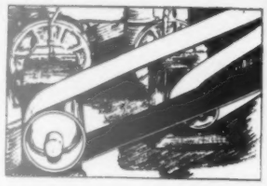

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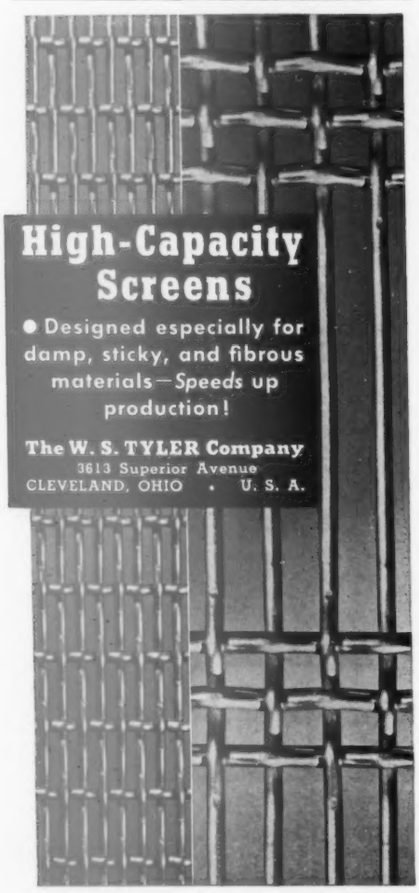
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Effect on Commerce

National Labor Relations Board v. Alloy Cast Steel Company, decided by the U. S. Circuit Court of Appeals, Sixth Circuit, February 5, 1941; reported at 117 Fed. (2d) 302.

It was contended that the National Labor Relations Board had no jurisdiction in this case because the company's refusal to bargain collectively with representatives of a majority of its employees (the practice complained of) had not led to labor disputes burdening or obstructing commerce. The court holds, however, that the purpose of the National Labor Relations Act is to forestall labor strife that may effect commerce. "So the jurisdiction of the Board is dependent not upon the actual occurrence of strikes in a specific industry, nor upon an immediate threat of their occurrence therein, and unfair labor practices fall within the scope of the act and the jurisdiction of the board not because they have led, or have tended to lead, to labor strife in a particular instance, but by reason of the fact that long and painful experience teaches that in the generality of cases they do lead to such strife." The board's enforcement petition is granted.

Disestablishment

New Idea, Inc. v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, February 6, 1941; reported at 117 Fed. (2d) 517.

The court here sustains an order requiring disestablishment of an association of employees on the ground of company domination, interference or support, of which "no one fact (of the evidence) is conclusive, but the whole congeries of facts before the board supports its findings." The employer sought to produce additional evidence which "tends to prove that after the hearing the association acquired a certain measure of independence." The introduction of such evidence was denied both by the board and by the court, since "such evidence would not disturb the finding that during the period covered by the hearing, the company dominated or interfered with the association and gave support to it. Nor would it render erroneous the board's determination that the effects of the company's conduct cannot be eliminated and the employees made entirely free without first disestablishing the association."

The Marion Steam Shovel Company announces the appointment of the Walling Tractor & Equipment Corporation, Portland, Oregon, as its distributor for Oregon and seven counties in southwestern Washington.

TRAFFIC News Digest

I.C.C. Decisions

Sand—Docket No. 28596, Continental Roll & Steel Foundry Company *v.* Wheeling & Lake Erie. Heard by Examiner L. J. P. Fichthorn. The rates charged on sand, shipped between March 12, 1937, and February 28, 1941, from Dundee, Ohio to Wheeling, West Virginia, proposed to be found unreasonable. The examiner stated the commission should find that on nine shipments originating between March 12 and December 19, 1937 the assailed rate of $1.20 was unreasonable to the extent that it exceeded a rate of $1.00, and that on the remaining sixteen shipments originating between October 9, 1939 and February 28, 1941 the assailed rate of $1.32 was unreasonable to the extent that it exceeded a rate of $1.10, and that a reasonable rate for the future should not exceed $1.10. Reparation with interest is recommended.

Cement—Fourth-Section Application. —Docket No. 18343, Cement from Leeds, Alabama, to Albany, Georgia. Authority was denied by fourth-section order No. 14225 to establish and maintain a rate of 17 cents on cement, concrete mix, and dry building mortar in carloads from Leeds, Alabama to Albany, Georgia, without observing the long- and short-haul part of the fourth section. The report states that the present rate over the route of the Central of Georgia from Leeds, to Albany, a distance of 233 miles, is 17 cents, and added that applicants proposed to establish that rate over the route of the Southern to Maplesville, Alabama, the G. M. & O. to Montgomery, Alabama, and the A. C. L., beyond, 415 miles, and over the route of the Southern to Selma, Alabama, the Western of Alabama to Montgomery, and the A. C. L. beyond, 443 miles. These routes, respectively, are 78 and 90 per cent. circuitous. It was the purpose of the relief to meet the competition of the Central of Georgia without reducing the rates at intermediate points on the longer routes. The commission stated that it was not convinced that it would be in the public interest to encourage, by a grant of fourth-section relief, the diversion of traffic from the shorter and manifestly more economical route to the longer and more expensive routes.

Motor Proposed Reports

Columbus, Ohio. — MC 101874, Frank C. Anderson, contract-carrier application. Joint board 208. Served May 28. Permit proposed. Lime and limestone products from Harrison Township, Preble county, Ohio, to points in specified areas of Indiana and Kentucky over irregular routes.

Kensington, Ohio.—MC 4658, Sub. No. 2, James Thompson, extension of operations. Joint board 59. Served May 27. Dismissal of application for a permit proposed at the request of the applicant. Clay products from Zoar, Sugar Creek, Dover, Uhrichsville, Magnolia, Waynesburg, and Toronto, Ohio to points in specified counties in Pennsylvania and West Virginia over irregular routes.

Logan, Ohio.—MC 48948. Sub. No. 1, Charles C. Chute, common-carrier application. Examiner U. E. Conlon. Served June 3. Certificate proposed. Clay products, except chinaware, from points in Hocking County, Ohio, to points in Indiana, and specified areas in Kentucky, Michigan, Pennsylvania and West Virginia over irregular routes, with the right to operate over Maryland highways for operating convenience only.

Fourth-Section Applications

Docket 19058—Filed by L. P. Kipp, requesting fourth-section relief to establish rates on cement, concrete mix, and masonry cement, carloads, from Leeds, Alabama to Harriman, Tennessee, circuitous routes being the grounds for relief. Schedule filed containing proposed rates is F. D. Miller's I.C.C. 572, Supplement 20.

Docket 19059—Filed by J. G. Kerr, requesting fourth-section relief to establish rates on cement, concrete mix, and masonry cement in carloads from points in Birmingham, Alabama group to Dothian, Alabama, circuitous routes being the grounds for relief. Schedule filed containing proposed rates is F. D. Miller's I.C.C. 572, Supplement 20.

Docket 19062—Filed by B. T. Jones, requesting fourth-section relief to establish rates on cement masonry and mortar cement and dry building mortar in carloads from points in central territory to points in Michigan and Wisconsin to meet carrier competition.

Docket 19067—Filed by B. T. Jones, requesting fourth-section relief to establish rates on stone, dressed or carved, blocks, pieces, or slabs in carloads from Indianapolis, Indiana to points in western trunk-line territory to meet market competition.

Docket 19068—Filed by J. G. Kerr, requesting fourth-section relief to establish rates on lime in carloads from points in the southwest to points in the south to meet carrier competition.

Docket 19071—Filed by R. A. Sperry, requesting fourth-section relief to establish rates on sand in carloads from Cayuga, Indiana to Charleston, Illinois, to meet potential wayside-pit competition.

Docket 19075—Filed by W. S. Curlett and I. N. Doe, requesting fourth-section relief to establish rates on cement in carloads from Buffalo, Brixmont, and Portland Point, New York to points in New England territory, circuitous routes to maintain grouping and to apply over short-tariff routes rates constructed on the basis of the short-line distance formula being the grounds for relief.

Docket 19079—Filed by R. A. Sperry, requesting fourth-section relief to establish rates on gravel in carloads from LaGrange, Missouri to Adair, Illinois to meet truck competition.

Fourth-Section Orders

Docket 13926 — (2nd supplemental) —Sand and gravel from Riverton, Indiana to Champaign, Illinois. Application 18564. Petition filed by B. T. Jones. Fourth-section order 13926 entered August 12, 1940 in application 18564 which by its terms as amended expires June 20, 1941 further modified and amended so as to provide that the relief authorized therein shall continue until December 20, 1941.

Docket 13967—(2nd supplemental) —Gravel from La Grange, Missouri to Illinois destination. Application 18630. Petition filed by R. A. Sperry. Fourth-section order 13967 entered September 17, 1940 in application 18630 which by its terms as amended expires June 1, 1941 further modified and amended so as to provide that the relief authorized therein shall continue until August 31, 1941.

Central Freight Association

Docket 67041—(Shipper's proposal) —Cement (Portland, natural, hydraulic or common) in carloads, minimum weight 50,000 pounds. Establish rate of 18 cents from Chicago, Illinois and Buffington, Indiana, to East Fultonham, Ohio.

Docket 67053—(Shipper's proposal) —Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) in open-top cars only. Establish rate of 75 cents per net ton from Lafayette, Indiana, to Ferguson, Indiana via the N.Y.C. & St. L.R.R. through Kokomo, Marion and Bluffton, Indiana.

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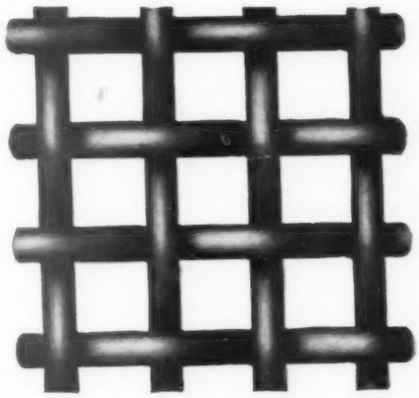

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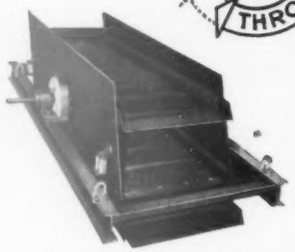

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Docket 67076—(Shipper's proposal)—Cement clinker in carloads, minimum weight 50,000 pounds. Establish a rate of 9 cents from Painesville to Warren, Ohio.

Docket 67077—(Shipper's proposal)—Clay or sand, processed for decolorizing, filtering or water-softening in carloads, minimum weight 80,000 pounds. Establish a rate of 55 cents from Charleston, West Virginia, and group, viz., Owens, South Ruffner, Charleston, Elk and South Charleston, West Virginia, to Laredo, Texas.

Heavier Carloadings

W. C. Kendall, chairman, car-service division, of the Association of American Railroads, in a circular letter to chief operating officers of Class I railroads, said many opportunities exist for increasing the average car supply, but few were more promising than the gains that are possible through loading more tonnage in each car. Reference was made to the fact that a new high record in the average load per car of all freight transported in carload lots was established in 1940 when it was 37.7 tons. Mr. Kendall also said that, while it was recognized that all cars could not be loaded to their maximum carrying capacities, there were many commodities moving in substantial volume where heavier loadings would be mutually beneficial and where continued efforts would result in increased utilization of equipment.

FOREIGN PRACTICE

Activity in Burning Stages of Kaolin

Dr. Engineer Wolf Straetling, in order to determine the real activity of the various burning stages of kaolin, conducted, in connection to Budnikoff's previous work (reported in 1935), a series of thermo-chemical measurements, and discusses the influence of the surface size upon the results. The author proceeds beyond this indirect thermo-chemical method to the evaluation of the burning stages. To determine the burning stage with the maximum activity and to determine for certain whether adsorption or reaction processes are involved, the procedure of conversion of meta-kaolin-lime direct through extended shaking tests with lime water was studied.

Screened kaolin dried at 110 degrees C. of the following composition was used: 46.80 per cent. SiO_2; 37.82 per cent. Al_2O_3; 0.70 per cent. Fe_2O_3; 0.25 per cent. TiO_2; 0.20 per cent. CaO; 0.23 per cent. MgO; 0.76 per cent. K_2O; 0.39 per cent. Na_2O; 0.05 per cent. SO_3; loss on ignition at 1,100 degrees C., 13.07 per cent.; total 100.27 per cent. Kaolin burned at 400, 500, 600, 700, 800, 900, 1,000, and 1,100 degrees C. for 3 hours was used also. Most of the water of constitution disappeared between 400 and 500 degrees C., and the loss on ignition was 0.00 at 1,100 degrees C.

Concerning the nature of the resulting dehydration products there are two opposing views: (1) the kaolin disintegrates into the free oxide, and there is a physical mixture of amorphous alumina and silicic acid; (2) there results an anhydride, $Al_2O_3 . 2SiO_2$, the meta-kaolin.

It has usually been attempted to decide between these two views physically or chemically by comparing the characteristics and reactions of the burned kaolin with that of a mixture of alumina and silicic acid. The results are not uniform but favor in general the existence of the meta-kaolin. Nor have X-rayographic investigations yielded a clear result. No final clarity exists today concerning the meta-kaolin problem. The nature of the products of the burn at higher temperatures is better known.

The author made optic and X-rayographic investigations on the kaolin and on a few stages of the burn, which are described and discussed. Thermochemical measurements are presented; also the determinations of particle size and surface areas. The reaction procedure of the chemical conversions is explained by way of experiment. The author uses 19 illustrations and 14 tables.

In conclusion, it has been shown that at the beginning of the reaction the heat tone is composed of moistening and adsorption heat, which is then superseded by the slowly setting in reaction heat of chemosorption. At the start of the reaction the kaolin ignited to 500 degrees C. develops the greatest amount of heat (total heat tone and adsorption heat). This heat tone decreases with increasing burning temperature. The maximum of heat tone is, therefore, in contrast to the measurements of Budnikoff, not at 800 degrees C. but at 500 degrees C. If the lime absorption is carried in relation to the burning temperature for various periods of shaking, it is shown that the 500-degree C. product has also the greatest chemical activity, which expresses itself in an increased absorption of lime. The maximum, which is indicated as especially sharp at the beginning of the reaction, is at 500 degrees C., also at extended shaking periods exceeding the periods of observation of Budnikoff.

Three opposing views are represented

in cement literature concerning the nature of the products of reaction of lime and kaolin, namely: (1) formation of hydrates of quaternary calcium-alumo-silicate; (2) the formation of hydrate of calcium aluminate; (3) the formation of hydrate of calcium silicate of undetermined composition. A number of investigators have conducted systematic studies concerning the combinations appearing in the systems CaO-Al_2O_3-H_2O and CaO-SiO_2-H_2O, which are reviewed.

Present views concerning the reaction between cement and water are supported by the results of the ternary systems, namely, that the lime silicate and the lime aluminate hydrate separately. The possibility of a reaction between the calcium silicate and the calcium aluminate in an aqueous solution among themselves under formation of quaternary bodies has to date hardly been considered.

Of quaternary combinations in the system CaO-Al_2O_3-SiO_2-H_2O, the natural calcium-alumo-silicate hydrates, the zeolites, are known, but distinguish themselves throughout by low lime content and high silicic acid content. No systematic investigation concerning this system was available, so that the characteristics of the reaction products were studied by the optic and X-rayographic methods.

The author describes the optic and X-rayographic identification of the reactions of meta-kaolin with lime, aided by microscopic examinations and views, and the results are compared. The new formations always had the same compositions which could not be identified by comparison with known silicate hydrates, aluminate hydrates, and lime zeolites.

The stability of both the lime-fat and lime-lean solutions was then investigated, also the stability in heating. Then Straetling reports on the conversions between lime silicate and lime aluminates in aqueous solutions; and between tricalcium silicate and tricalcium aluminate; and on the reaction between tricalcium silicate and monocalcium aluminate—showing that lime silicate and lime aluminate in aqueous solution react with each other, and that the reaction products are identical with the new formations arising in the lime fixing of the meta-kaolin.

Tests were then made to identify the quaternary combinations in the system lime-silicic acid-alumina-water to determine the homogeneity of the new formations; optically and X-rayographically they appear always to be the same.

In conclusion it appears that in the system lime-silicic acid-alumina-water in equilibrium with saturated calcium-hydroxide solutions there exist two stable basic bodies, namely the hydrate of tricalcium disilicate, and the quaternary combination probably of the composition $2CaO.\ Al_2O_3.\ SiO_2.$ aqu. which must form themselves as stable end products in all the reactions in which the components lime, silicic acid, alumina, and water react with each other in the corresponding mole relations. These combinations form especially easily with conversion of the meta-kaolin with lime which is to be formulated about as follows: $Al_2O_3.\ 2SiO_2.\ 3\frac{1}{2}CaO.$ aq. $\frac{1}{2}3CaO.\ 2SiO_2.$ aq. $2CaO.\ Al_2O_3.\ SiO_2.$ aq.

Owing to this clearly and smoothly proceeding reaction it can be stated with certainty that burned kaolin in mixture with Portland cement reacts chemically with the calcium hydroxide liberated in setting and also intervenes in the hardening procedure. In the setting of the Portland cement these combinations should appear also as stable end products. However, only the silicatic component is proved, whereas the alumina-bearing quaternary combination obviously forms only after a longer interval of time. It is noteworthy that the alumina is present at that time in the form of a lime-lean combination with silicic acid, instead of in the form of a lime-fat lime-aluminate hydrate, and therefore the set mortar in a state of equilibrium contains considerably more free lime than would be suspected to date.—*Zement,* vol. 29, no. 25 (June 20, 1940), pp. 311-313; no. 26, pp. 323-325; no. 27, pp. 337-340; no. 28, pp. 351-356; no. 29, pp. 365-366; no. 32, pp. 401-405; no. 33, pp. 413-415; no. 34, pp. 427-432; no. 35, pp. 441-445; no. 36, pp. 455-460; no. 37, pp. 475-477.

Influence of Water on Concrete Strength

Engineer Francmanis concludes from investigations that the water used in concrete influences its strength in three directions, through (1) the quantitative action upon the procedure of hydration, (2) the influence upon the characteristics of the hydration products, and (3) the forming of various water pores (since the density of the concrete is varied). These three factors depend upon the technological action of the water on the cement.—*Zement,* vol. 29, no. 30 (July 25, 1940), pp. 377-380; no. 31, pp. 389-392.

Determination of Fines in Concrete Aggregates

Dr. Kurt Walz states that for judging the granulation of concrete aggregates the finest sieve used is generally the 0.2-mm. size. But it has been proved

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of value to know a further gradation of the fine sand below 0.2-mm., since the particle synthesis in this range is not without influence upon the characteristics of the concrete, and since in this particle group are also those substances which, due to their fineness, are often indicated as injurious—these are the so called elutriable constituents which are present as loam or clay or also as fine rock dust.

These elutriable constituents: (1) act through the chemical reciprocal action with the constituents of the cement, especially when they are very fine particles with larger inner surfaces, as for instance humous substances in colloidal form as loam or clay; or (2) they act through the formation of films on the coarser particles, so that the setting of cement on them is prevented and strength is thus kept low, especially when the substances are so fine that they give a plastic mass in the damp state; and (3) they act through their quantities and particle gradation, since through this they influence the particle synthesis of the total mixture and generally may act detrimentally. The action of the finest particles upon the concrete's strength depends also upon the gradation of the aggregate, the nature of storage, the age of the concrete, and the kind of use of the concrete, whether fluxural or compressive.

Determination of the finest constituents has been made by very different methods which have been introduced with difficulty. A standard method is proposed by the author for use in the field; this is claimed to give practically the same values as the pipette method of Andreasen and requires only simple equipment and can be used on a larger sample of aggregates.

A particle group to be investigated is distinguished by deleteriously acting fine particles, which is the particle group to 0.02 mm. To determine the especially detrimental films surrounding the particles, a peptisation agent is added to the elutriating water (soda, sodium oxalate, sodium pyrophosphate, etc.). It is not sufficiently possible to bring the films in solution by washing with ordinary water and to determine the total volume and the gradation by a slurry method. On the other hand, no coagulation must set in in the slurry (flaking out of suspended particles), since this makes the determination of particle size faulty. Therefore, the simplified sedimentation method described below is followed:

Draw a good average sample of 5.00 kg. from the aggregate and place in a cylindrical container 30 cm. high, and of 31-cm. inside diameter, adding about 5 liters of boiling water. To better detach the clay films from the aggregate and to avoid coagulation add 34 g. sodium pyrophosphate ($Na_4P_2O_7 \cdot 10H_2O$). The contents are then stirred vigorously for at least 10 minutes and poked. The sufficient cold water is added so that the entire volume of water in the container (including the self-moisture of the aggregate as determined in another sample) amounts to 17.00 liters. Now it is again stirred for 10 minutes. If a test by the eye (lifting the aggregate from the bottom of the container by means of perforated dipper) indicates that the aggregate does not yet have a clean surface, and that there is still loam, clay, etc. in lumps, more stirring is required until complete elutriation is effected. Then the moved liquid is brought quickly to quiet (as by introducing a metal sheet and counter motion). Then the sample is drawn off, as described below, bearing in mind the Stokes formula for the sinking period of particles of 0.02-mm. diameter.

After the liquid has quieted, start a stop watch and, depending on the time indicated in the table below in relation to the temperature of the slurry, remove through a suction tube 1 liter of the liquid from the middle of the container 15 cm. below the water surface.

Temperature (deg. C.),	16	18	20	22	24
Time (minutes, seconds).	7 m. 43 s.	7 m. 21 s.	6 m. 58 s.	6 m. 38 s.	6 m. 18 s.

Since drawing of the sample takes about 30 seconds, start drawing 15 seconds before the time indicated by the table.

The slurry thus obtained is evaporated in a porcelain dish weighed previously. When dry weigh to within an accuracy of 0.1 g. From the weight of the solid constituent in the slurry thus obtained, deduct the sodium pyrophosphate remaining after the drying operation, which is about 1.2 g. (left of the 2 g. added per liter of water). The remaining weight corresponds to the gradation to 0.02 mm. and is given in percentage of the dry weight of the examined gravel sand.—*Zement,* vol. 29, no. 34, (August 22, 1940), pp. 435-437.

National Gypsum Makes Quarry Improvements

A 2-cubic yard Dempster-Dumpster hauling unit with ten 2-cubic yard drop-bottom detachable buckets has been installed in the Strasburg, Virginia, quarry of the National Gypsum Company.

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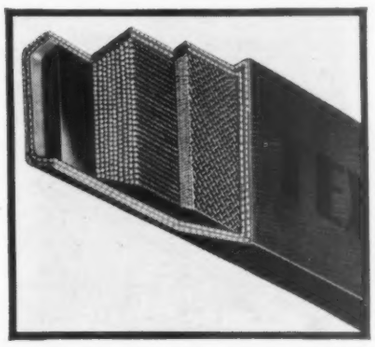
NEW MACHINERY and SUPPLIES

• V-Belting

The Allis-Chalmers Manufacturing Company, Milwaukee, pioneer in the field of multiple V-belt transmission, has again made fundamental improvements in V-belt structure. It announces that all its Texrope V-belts are now of the new "Super 7" laminated design, based on the Vogt formula and abundant field experience, to include more strength and flexibility, greater service and longer life.

The cords in the new "Super 7" belts are smaller, allowing the use of more cords per belt with a resulting greater strength and less



Cut-away view of the new V-belt.

stretch. Each cord is individually imbedded in heat-dissipating rubber to reduce internal belt degeneration. These belts are made in matched sets to assure uniform, smooth running, highly efficient drives. Each element of the belt is designed to fulfill an individual function. The live rubber bottom cushion absorbs the ceaseless impacts of operation. The central cord portion transmits power at the effective pitch diameter. The bias-cut fabric prevents "dishing" and assures transverse stability. The 2-ply rubber-impregnated fabric cover prevents destructive agents from reaching the vital belt elements, resulting in a high grip co-efficient between belt and sheave walls.

• Turn-Table

Speed is the keynote of current construction, particularly where national defense projects are directly or indirectly involved, and American equipment makers are busy turning out time-savers for the construction industry. One of these construction short-cuts is the recently improved Blaw-Knox truck turntable, which allows trucks to turn around in restricted spaces.

The turning mechanism is simplicity itself, consisting of a circular pan or "sled," and the whole table turns on this sled. Both single and double end turntables are furnished, in capacities up to 27 tons gross load, and one man can turn a loaded table. Ramps are always furnished with the single end turntables, and these are attached at one end with a bumper rail provided at the opposite end; one model of the single end turntable includes a hinged ramp. Steel ramps at each end can be furnished for double end turntables if desired, or the purchaser can build his own ramps of wood from detail drawings furnished by the Blaw-Knox Company.

Wherever trucks may be turned or backed, the turntable offers the advantage of allowing more truck trips per hour because it saves the

Truck being turned on the table.

time of backing and turning, eliminates lost time in backing long distances, expedites delivery of batches to the paver on paving construction, avoids cutting up of subgrade, and saves wear and tear on the trucks.

• Loader

With a year and a half of successful performance of the company's model 75W as a measuring stick of pneumatic-tired loader operation under widely varied conditions, the George Haiss Manufacturing Company, Inc., has gone on to produce the new Model 80W. This machine is the wheel-mounted counterpart of the Model 80 creeper-tread model. Its digging-loading mechanism is the same and the rated capacity likewise, 3 to 5 cubic yards per minute in heavy-duty work up to the handling of larger sizes of crushed stone.

The Model 80W weighs 20,000 pounds. Weight distribution in relation to front and rear axle loading has been carefully engineered so that 9.00-20 single tires in front and dual tires of the same size in the rear all carry approximately equal loads. It is powered with a 50-horsepower gasoline motor of standard make. Incorporated in the Model 80W is a new, heavy-duty clutch and gear box, in which all shafts are mounted on Fafnir deep-grooved ball bearings of the external self-aligning type.

Motor truck type running gear is employed, with standard Saginaw recirculating worm nut and sector gear steering device. A pedal operated traction brake, with latch, is provided. All controls are grouped at the operator's platform.

New pneumatic-tired bucket-loader.

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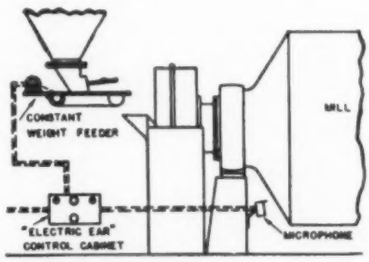

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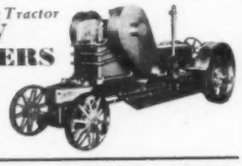

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ESTABLISHED 1881

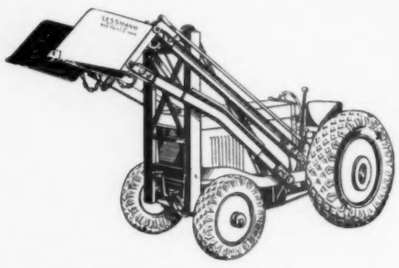
This 33-cubic yard La Plante Choate "Carrimor" scraper on Goodyear 24.00-32 "Earth Mover" all-weather tread tires is in service on a job in southern Ohio. Tires are a recent development of the Goodyear Tire & Rubber Company, for heavy-duty service where maximum traction and flotation are required.

A notable design feature is the 11 foot 4 inch clearance under the discharge chute at 35 degree setting. This takes care of high truck bodies as commonly employed. At a 50 degree discharge angle setting of the chute, the clearance is 10 feet.

• Tractor Shovel

The Lessmann Manufacturing Company of Des Moines, Iowa is now supplying its front-end shovels for a number of popular tractor models including International, Fordson, Oliver and John Deere. Shovel capacities range from ⅜ to ¾ cubic yards.

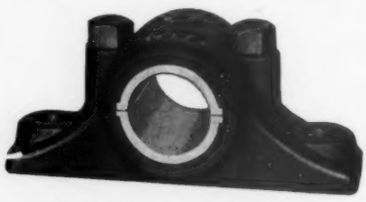
The main frame on these economical material handlers is separate from the entire shovel assembly. A double cable lift is employed. Control is by a positive multiple-disk clutch of patented design. Although mechanical-operated hoisting power is recommended by the manufacturer, the user may have hydraulic hoists if desired.



One of the tractor-shovels.

• Bearings

A new and improved line of solid- and split-journal bearings, carried in stock and neatly cased and labeled for prompt delivery, is announced by The Jeffrey Manufacturing Company, Columbus, Ohio. Of accurate dimensions with modern rounded lines and smooth gun metal finish, these precision-made bearings have machined bases and faced ends. Height to center line of shaft is rigidly maintained. The babbitted bores are broached to smooth hard surface and require no "wearing in."



One of the journal bearings.

Both styles are tapped for grease cups or pressure fittings. An ample storage groove in the top provides proper distribution of lubricant. In addition, the split bearing has feeder grooves on each side. Individual containers are furnished for easy handling and protection in shipping

Trade Literature

Pyrasteel . . . Facts for Cement Mill Operators, (folder), Chicago Steel Foundry Company, Chicago.

Wemco Sand Classifiers, (Bulletin 640). Western Machinery Company, San Francisco.

1941 Steel Stock List. 268 pages. Joseph T. Ryerson & Son, Inc., Chicago.

Type · S Centrifugal Pumps, (Bulletin B6146), 40 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

Slackline Cableway Excavators, 24 pages. Sauerman Brothers, Inc., Chicago.

Williams Buckets. (Series of 4-page folders describing the various types.) Wellman Engineering Company, Cleveland.

How to Start and Protect a Synchronous Motor (Bulletin GES-2677), 4 pages. General Electric Company, Schenectady, New York.

Continuous Centrifugal Dryers and Clarifiers, 8 pages. Centrifugal & Mechanical Industries, Inc., St. Louis.

Bixby-Zimmer Tailor-Made Screens, 4 pages. Bixby-Zimmer Engineering Company, Galesburg, Illinois.

Timken Bearings in National Defense, 32 pages. Timken Roller Bearing Company, Canton, Ohio.

Falk Airflex Couplings, (Bulletin 8100), 20 pages. Falk Corporation, Milwaukee.

Model 855 Shovel, (Bulletin X-20-1). Harnischfeger Corporation, Milwaukee.

Type G-500 Wagon Drill, (Bulletin SP-2024), 4 pages. Chicago Pneumatic Tool Company, New York City.

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The CONCRETE MANUFACTURER

July, 1941

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Pipe for Proving Ground

The Lock Joint Pipe Company of Ampere, New Jersey has been operating a field plant for the past few months near North Vernon, Indiana to supply concrete pipe for the construction of the Jefferson Proving Ground, near Madison, Indiana.

The plant has been making poured pipe units in diameters of 24, 30, 36, 42 and 48 inches and transporting them 22 miles by special flat-bed trucks to the proving grounds. The North Vernon site was selected because of good transportation facilities and despite the relatively long haul necessary.

A Rex drum-type mixer charges the concrete into pneumatic-tired buggies which are pushed along an elevated runway and the concrete deposited into the forms. Vibrating tools are inserted into the filled forms to compact the concrete.

Reading down—Pouring plant at North Vernon; mixer and skip; truck-load of pipe leaving for proving ground.

Exposed Interior Walls

With a view to its proposed use as a public auditorium, special care was taken in constructing the interior walls of the main arena portion of the Coliseum recently completed for Indiana State Fair, Indianapolis.

Architects, Russ & Harrison, Indianapolis, coöperated with The Spickelmier Fuel & Supply Company in the design of a special Haydite mix for the concrete blocks and bricks used, in order that the structural requirements would be met and the acoustics of the immense auditorium be as near perfect as possible.

Interior view of the Coliseum.

The blocks were made on one of the three Stearns Joltcrete machines operated by the Spickelmier company. The vibrating action of the Joltcrete machine results in a consolidation of aggregates that does not fracture the large particles and also in a re-mixing of the concrete mass in such a way as to cover each grain with a coat of mortar. The result is a unit which the architects found to fulfill admirably the structural and acoustical demands for which these blocks were used.

The bricks were made on an old-style Anchor tamp machine. The manner in which the block and brick units were combined in the wall produces an effect that has occasioned many favorable comments. The J. L. Simmons Company, Indianapolis, handled the general and masonry contracts.

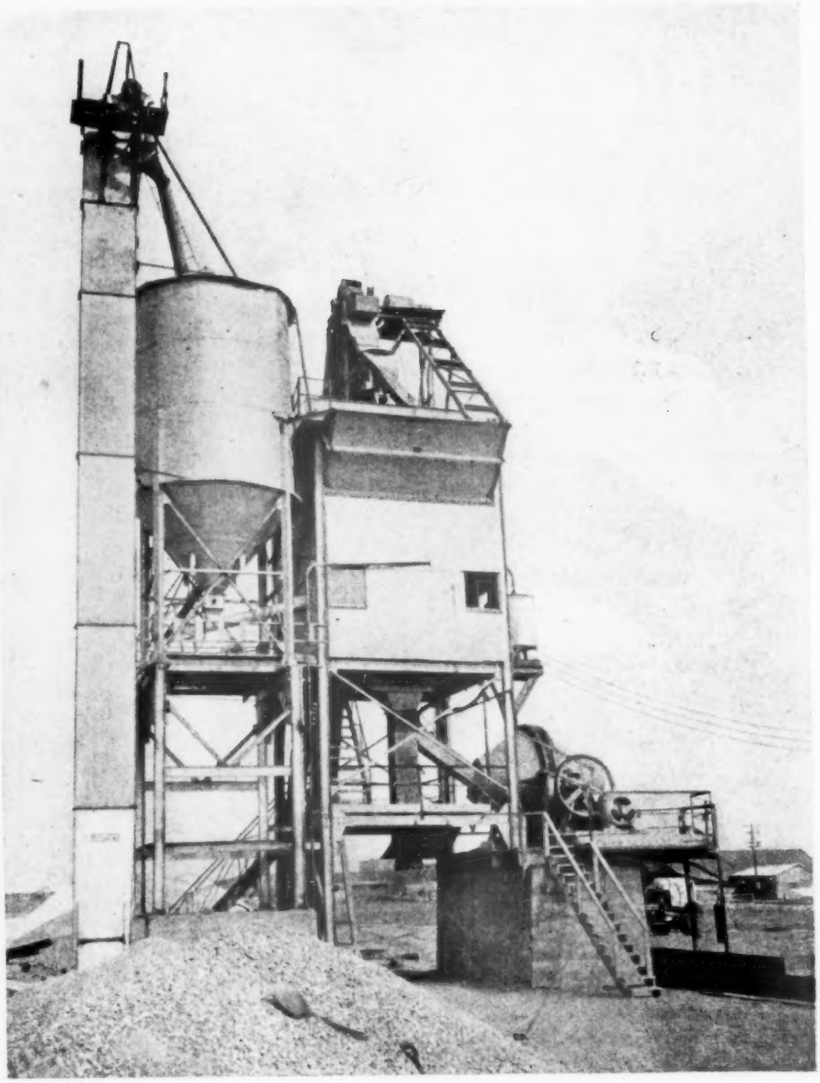
ROQUEMORE EXPANDS IN READY-MIX FIELD

IN an article published in the July, 1940, issue of PIT AND QUARRY the new aggregate-bituminizing plant of the Roquemore Gravel & Slag Company at Montgomery, Alabama, was described. At that time ready-mixed concrete was being delivered in mixer trucks loaded from temporary bins. Shortly thereafter the company completed its new all-steel and concrete central-mixing plant which is one of the best in the South and makes this one of the outstanding material yards. Aggregates for both plants come mainly from the company's sand-and-gravel plant which is a few miles away and was built in 1938. The two new plants are distinctly separate units and each has its own storage facilities.

Aggregates for the concrete plant are unloaded from cars to a stock-pile by a locomotive crane. This stockpile is over a 250-foot concrete reclaiming tunnel with openings spaced 7 feet apart and has a capacity of 300 to 400 cubic yards. Three grades of gravel and two grades of sand are stored and a section of the tunnel is left open so special aggregates can be handled if called for. The Robins tunnel belt-conveyor carries the desired aggregates to a Jeffrey belt-bucket elevator. Both are driven through Falk speed-reducers. Gates V-belts are used on most of the other drives. The aggregates are discharged into the various compartments of the plant bin through a revolving spout which is controlled by a cable from the ground or the batching floor. Signal lights in the tunnel, actuated by top-level indicators in the bins, show when a bin is full. The 3-compartment Butler steel bin has a total storage capacity of 180 tons.

The cement is received in bulk in special hopper cars. A screw-conveyor and a bucket-elevator feed the cement into the 800-barrel Butler steel bin. The cement is withdrawn from the bin through a rotary valve and an inclined screw-conveyor feeds it into the Butler cement-weighing batcher. A push-button starts the cement screw which is shut off automatically when the weight set on the scale beam is reached. This scale has an over-and-under indicator and can be operated manually if desired.

Automatic scales and batching equipment for cement and aggregates.



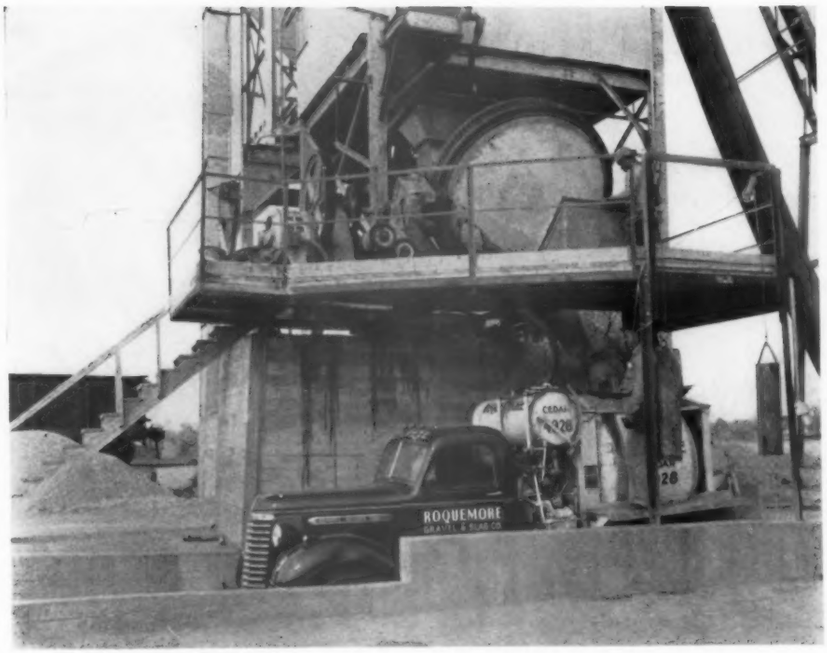
The Montgomery plant with cement elevator and bulk-cement bin. Chute for loading out aggregates is shown.

The water is weighed in a Butler tank which is now manually operated, but can readily be equipped for automatic operation. A 3-beam scale, which is equipped with an indicator, is used. One beam is used to subtract the aggregate-moisture content, one for average weights up to 150 gallons or 1,250 pounds, and one for weights up to 50 pounds or 5 gallons.

Three lever-operated gates control the feed of aggregates into the Butler aggregate-weighing batcher. Usually these bins contain No. 1 and No. 2 sands and gravel. The No. 2 sand is used only for masonry. The 6,000-pound capacity batcher is equipped with three beams and an indicator.

Under the batchers is a selective spout which can discharge the batched materials into the plant mixer or direct into trucks. This by-pass arrangement is used to fill orders for sand and gravel which are weighed out into dump trucks. It can also be used to dry-batch aggregates and cement into the truck-mixers.

The T. L. Smith 2½-cubic yard tilting mixer is used to shrink-mix the concrete about 30 seconds before it is discharged into the truck-mixers. In this way a 1½-cubic yard truck-mixer can carry a 2-cubic yard load and a



The shrink-mixer at the plant discharging a batch into a waiting truck-mixer.

The bulk-cement batching plant and truck-mixers on location at Camp Croft.

A construction scene at Camp Croft. Note heavy tire-tread design on the truck.

3-cubic yard mixer can haul 4 cubic yards. This system makes it possible for the plant to shrink-mix and load 200 cubic yards of concrete per hour and at the same time batch out large quantities of aggregates.

The company has a fleet of 24 Jaeger truck-mixers, of which 19 are 3-cubic yard and 5 are 1½-cubic yard machines. Most of these machines are mounted on Dodge 2½-ton trucks and some International trucks. Ten additional 4-cubic yard Jaeger truck-mixers have been ordered. These are to be mounted on Dodge trucks with dual-driven rear axles.

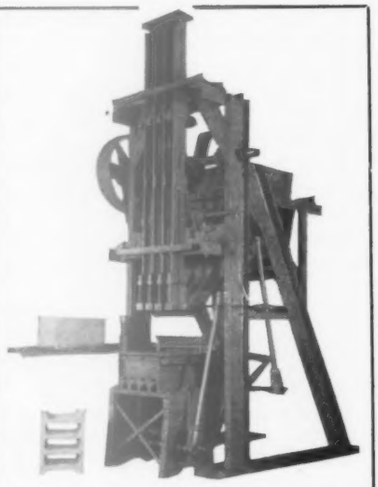
Most of the concrete produced is sold for general residential and business building construction but sand and gravel and bituminized aggregates have been supplied to several local defense projects. The company has, however, been actively engaged in supplying ready-mixed concrete for army camp construction from a portable batching plant.

On December 10, 1940, the company was awarded a contract to supply 40,000 cubic yards of concrete for the construction of barracks, warehouses, etc., at Camp Croft, an army infantry camp near Spartanburg, South Carolina. The portable batching plant was in operation and the pouring of concrete was begun on December 18. Pouring was carried on through the winter, even in below-freezing temperatures and the major part of the job was completed late in April. During the cold weather the mixing water was heated, steam coils were used in the bins and steam jets in the stock-piles.

The aggregates used on this project consisted of crushed granite from Blairs and sand from Columbia, South Carolina. Cranes unloaded these materials from cars into the bin of a Blaw-Knox batching plant. Bulk cement was received in hopper cars and was fed by a screw-conveyor and an elevator into a 350-barrel Blaw-Knox bin. Manually-operated batchers were used and water was measured from a tank at the aggregate-batching plant.

The truck-mixers returned to the plant after each load with 10 gallons of wash-out water. Cement was then added and the aggregates were loaded last. A 1:2:4 mix was used and the concrete had to meet a slump test and strength requirements of 2,000 pounds in 7 days and 2,500 pounds in 28 days.

At one time the company's entire fleet of 24 truck-mixers was in use on this job. The peak output required was from 600 to 700 cubic yards in an 8-hour day but it is said that 1,000 cubic yards could have been produced if necessary. During the rainy season some trouble was experienced with the standard single-axle-driven trucks until



An All-Purpose Machine

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

ONE Machine for ALL Size Pipe

Cut your costs of concrete pipe production by using the same machine for all sizes from 6" to 60".

Universal "all purpose" concrete pipe machine produces quality pipe at lowest cost, because it requires smaller investment, insures greater footage per bag of cement, and more pipe per man.

Start the concrete pipe business with Universal equipment, and you will be sure of maximum profits.

Write for Bulletin

UNIVERSAL CONCRETE PIPE CO.
Columbus — Ohio

they were equipped with Firestone "Mud-Grip" tires.

The concrete-producer's bugaboo of truck-mixer waiting time at the job was a problem until the company decided to charge $2.50 per hour for waiting time.

Aggregates-batching bin at Camp Croft.

In the first month at Camp Croft these penalties cost the contractor thousands of dollars but in ensuing months dropped to only a few hundreds dollars.

Non-Uniform Shrinkage Cause of Cracking

What causes the majority of cracks seen in concrete? Professor George A. Maney of Northwestern University declares that he has an answer which may lead to a tremendous increase in the use of concrete as building material and the saving of millions of dollars a year in maintenance costs of concrete structures.

Engineers have long thought that the warping, cracking and change of shape in concrete, under pressure, has been due to a slow change in shape called "plastic flow." Professor Maney asserts that such change in shape is not due to "plastic flow," but to non-uniform shrinkage which occurs simply because the surface of a concrete body loses its moisture much more quickly than does the inside. That concrete is an elastic, not a plastic material, is his firm belief.

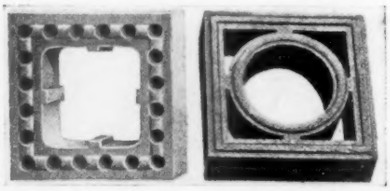
"We have now cleared the field of a gross misconception, and are in a position to attack the problems of concrete from an entirely new approach. We have proved that what has heretofore been regarded as an inherent fault of this material does not exist," Professor Maney declares.

The Platte Valley Cement Tile Company, operating plants in Nebraska at Fremont and Kearney, is establishing a third plant at Scottsbluff.

● Flue Blocks

In line with the increased interest being manifested by concrete-products manufacturers, the Multiplex Concrete Machinery Company, Elmore, Ohio, announces the availability of its improved line of flue-block machines, molds and accessories.

Multiplex chimney-block machines make the new 16- by 16-inch round ventilated flue liner



Lightweight block for vitrified flue liner and, at right, round-hole ventilated block.

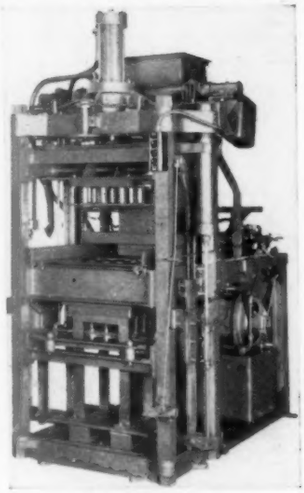
block as well as the light-weight and solid models for liners as well as for building complete chimneys.

The accompanying illustration shows two types of flue block produced with Multiplex equipment.

The Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed the Northwestern Road Supply Company, Watertown, South Dakota, to handle its complete line of construction equipment in certain sections of South Dakota.

A new ready-mixed-concrete plant entailing an investment of about $30,000 is reported under construction at Burlington, Iowa, by the W. G. Block Company.

Why not BUY the LATEST FASTEST and BEST PRODUCTION BLOCK MACHINE



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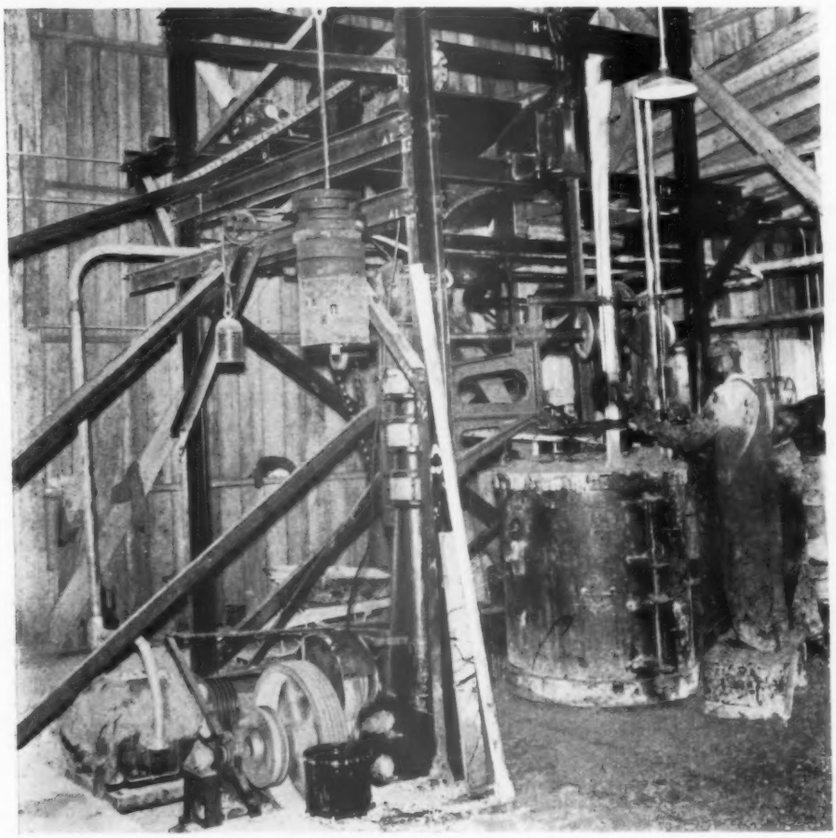
Write for information.

KENT MACHINE CO.
Cuyahoga Falls, Ohio

Some of the pipes for government air fields in the storage yard of the new Tampa plant.



The new double-tamper pipe machine in the new plant of the Sherman Concrete Pipe Company in Tampa, Florida.

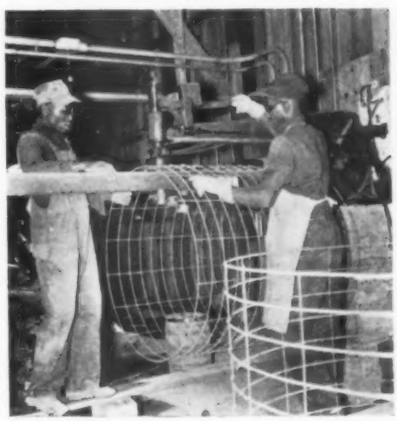
Defense Demand Prompts Erection of Concrete-Pipe Plant at Tampa

THE tremendous demand for all types of materials created by the defense and re-armament program was largely responsible for the construction of a new concrete-pipe plant at Tampa, Florida, by the Sherman Concrete Pipe Company. This plant, in operation in January, 1941, is located at Cass and North Rome Streets in Tampa and supplements an older plant operated by this company at 602 South Fremont Street since 1925. The new plant swells to 8 the total number of plants operated by this company in the southern and southeastern states. All the equipment in this plant was made by the company's manufacturing branch in Knoxville, Tennessee.

The old plant is now being used mainly for the manufacture of pipe for ordinary uses for the county, state, municipalities, railways, etc. Almost all the special defense orders are being filled from the new plant. Most of this business consists of reinforced-concrete drainage pipes from 8 to 48 inches in diameter in both tongue-and-groove and bell-and-spigot types. Orders have already been received for over 100,000 lineal feet of such pipe and more orders are being added from time to time. This pipe is being used chiefly for the U. S. Army Southeastern Air Base which includes McDill Field near Tampa and affiliated airports at Sarasota, Fort Myers, Lakeland, Orlando, Arcadia, Avon Park, etc. These pipes are being made to meet the state highway and the C7637 specifications.

Because of the haste with which this plant had to be built to meet these rush orders, the arrangement of the equipment is only temporary and will be improved when time is available. At present the native sand and rock aggregates are being fed to the mixer by hand in buckets but a mechanical handling system will later be installed. Cement is dumped into the mixer from sacks. Concrete is discharged from the 16-cubic foot Stearns mixer to an inclined chain-conveyor which discharges it into the hopper of the Sherman pipe machine. A mixing feeder discharges

The temporary method of feeding aggregates to the concrete mixer.



The spot welder used to weld the reinforcing cages.

KIRK & BLUM

STEEL FORMS
for Concrete Joists

These forms are made in standard 20-ft. lengths. Also special lengths to meet individual requirements. The illustration above shows method of removing complete set of poured joists, which permits multiple production where desirable or feasible.

HEAVY DUTY VIBRATING TABLES can be furnished

We manufacture Sewer Forms—Curb and Gutter Forms—Steel Concrete Forms of all Kinds. Write for details—no obligation.

THE KIRK & BLUM MFG. CO.
2818 Spring Grove Avenue
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PAK-CRETE

The Efficient, Low Cost Block Machine *combining*
VIBRATION AND PACKING
For exceptional quality blocks at remarkably low cost—there's nothing like PAK-CRETE.
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KRAMER PRODUCTS CO.
Industrial St., Peoria, Illinois

the concrete through a chute into the concrete-pipe form on a revolving table.

The machine is of the latest type and has two separate swinging double tamper arms each striking 700 blows per minute. Each tamper is driven by a 5-horsepower General Electric motor through Gates V-belts. A 30-horsepower motor drives the turntable and the stationary pipe core lift through Gates V-belts and clutches, and the feeder through a chain. The chain conveyor is driven by a 5-horsepower motor and the mixer by a 4-horsepower Westinghouse motor through Gates V-belts. This machine has made 75 pipes 36 inches in diameter and 4 feet long in a 9-hour day.

T. S. Marett, general superintendent, and some of the porous concrete pipes.

Sherman off-bearing carts are used to transport the pipes to the curing rooms where they are cured under sprays for 48 hours before being transferred to outdoor storage.

Reinforcing cages are made on a Sherman cage roll which is driven by a 2½-horsepower Lincoln motor. A Sherman spot welder is used for welding the cages.

At the old Tampa plant there is being made a porous concrete pipe which was originally developed for the U. S. Army Engineers to take care of the sweating of the concrete in Norris Dam. This pipe is similar to that being used in large western dams which have been described in these pages. Some of this pipe has been sold locally for ordinary land drainage but no strenuous efforts have been made to develop this market because of the press of other business.

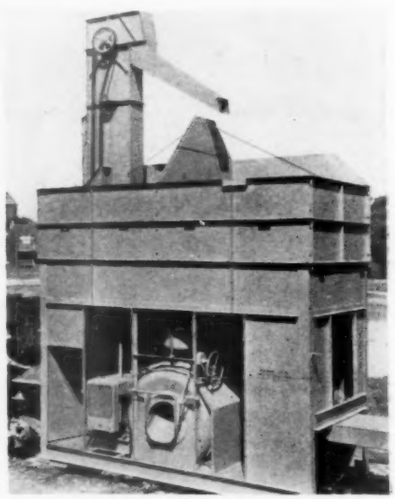
One interesting installation of this pipe was made in Sarasota where a utility company was troubled with sand which got into the cooling water and caused excessive wear in its pumps. A 300-foot line of this porous pipe was laid on the floor of the bay with its end blocked and the sides rip-rapped. Water free of sand is being drawn through the sides of the pipes.

This porous pipe is being made only in 10-inch diameter with a 1 1/16-inch wall thickness and tongue-and-groove ends. New York trap rock is used in its manufacture.

• Portable Plant

Improved through years of use, the Fieroh-type concrete plant lowers costs on volume pouring jobs. Easily moved from job to job by highway or rail, the plant is a completely self-contained unit. In actual operation it has begun mixing concrete four hours after arrival (using only a three-man set-up crew) and was on its way to another job one hour after mixing had stopped. Designed to accommodate truck deliveries without expensive structural ramps, the plant has extra capacity bins as insurance against delays from interrupted truck service.

Platform framing is all welded design with front gooseneck equipped for tractor hauling. The rear axle is one piece equipped with dual wheels, vacuum booster brakes and standard rims and tires. Wheels and tires are easily detached (while machine is located on job) and stored in safe place or used on other trucks until machine is to be moved. The bin is of two compartments with 32 cubic yards capacity. The bucket elevator, located at one end within the machine, has a capacity of 60 tons per hour and is hinged about half way up, so that the upper section can fold horizontally within the bin without detaching any chains. The weigh-batch hopper is rectangular in shape, supported from scale beams overhead, and has ample mixer-drum capacity. Two bottom dump gates on hopper give fast flow of materials.



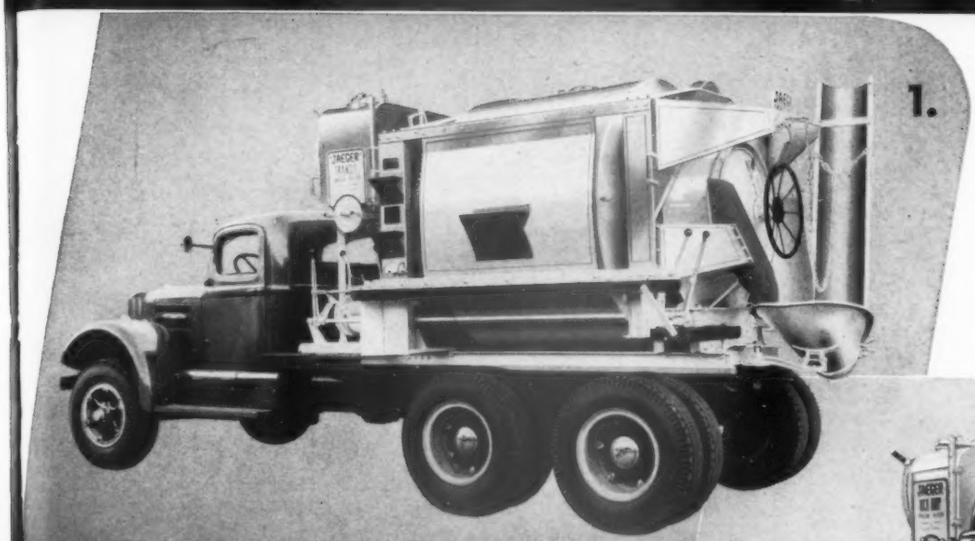
The portable concrete plant.

The mixer is of the drum type supplied by a well-known manufacturer, 14 cubic foot size complying with A.G.C. Standards for capacity. The water tank is of the syphon type, free of dribbles and accurate within one pint or pound.

The plants are built and supplied by the R. W. Fieroh Company of Chicago.

The Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed The State Tractor & Equipment Company, Phoenix, Arizona, as their exclusive distributor in the state of Arizona to handle their complete line of construction equipment.

Only JAEGER Equips You to Meet EVERY Ready-Mix Demand

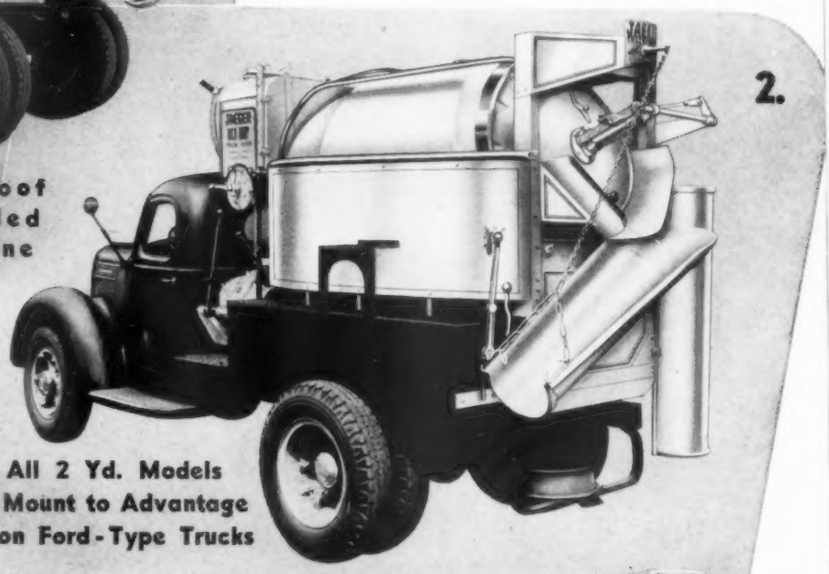


1.

All Jaegers Have 2-Speed Shock-Proof Transmission—Vacuum Cab Controlled Truck Engine Drive or Separate Engine

Standard LOW CHARGE

Type: Lowest, most economical to load; fastest on the market to mix and discharge — produce maximum daily yardage of proven higher strength concrete. Sealed drum meets any specification. Sizes 2, 3, 4, 5, 5½ yds.



2.

All 2 Yd. Models Mount to Advantage on Ford-Type Trucks

HIGH DUMP Types:

(2) Top Loading Models with "Sealed Drum"

(3) Or Combination Top and End Loaders (Pat'd)

Far outselling all other high discharge truck mixers today because they are fastest to load, mix and discharge any slump concrete — and are the only high discharge truck mixers that meet every specification and job condition.

"Sealed Drum" Models take full load in one quick drop through the top. Fast Vacuum-Controlled Discharge Door seals against loss of moisture and heat in winter concrete.

Jaeger End Loading Hopper Attachment (specially adapted to older or temporary plants not equipped for ribbon loading) offers many advantages over all other end loaders — and does not interfere with use of Top Loading Door where specified by engineers. (See details at right.)

Both types are built in 2, 3, 4 and 5 yd. sizes.

3.

Jaeger Charging-Discharging Hopper Attachment Permits Top or End Loading in Order to Meet Conditions - - -

The only end-loader which does not constrict drum opening and slow up charging and discharge. One quick turn of hand wheel opens Discharge Gate — no need to move entire Hopper (requiring many turns of a wheel) — no second seal to leak or wear.

JAEGER PORTABLE HOPPER

Saves Truck Mixers Waiting—Means 25% More Pay-loads per Day on Average Job. Tows to job behind truck mixer — takes full 2 or 3 yd. batches. One hopper serves almost any job.

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Complete 1941 Data, Models, Specifications, Prices, Terms

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Send us newest information on ☐ Standard LOW CHARGE Truck Mixers, Agitators, ☐ HIGH DUMP Models, ☐ Portable Hoppers, ☐ Auto-Pavers and Spreaders, ☐ Pumps, ☐ Mixers, ☐ Hoists, ☐ Carts.

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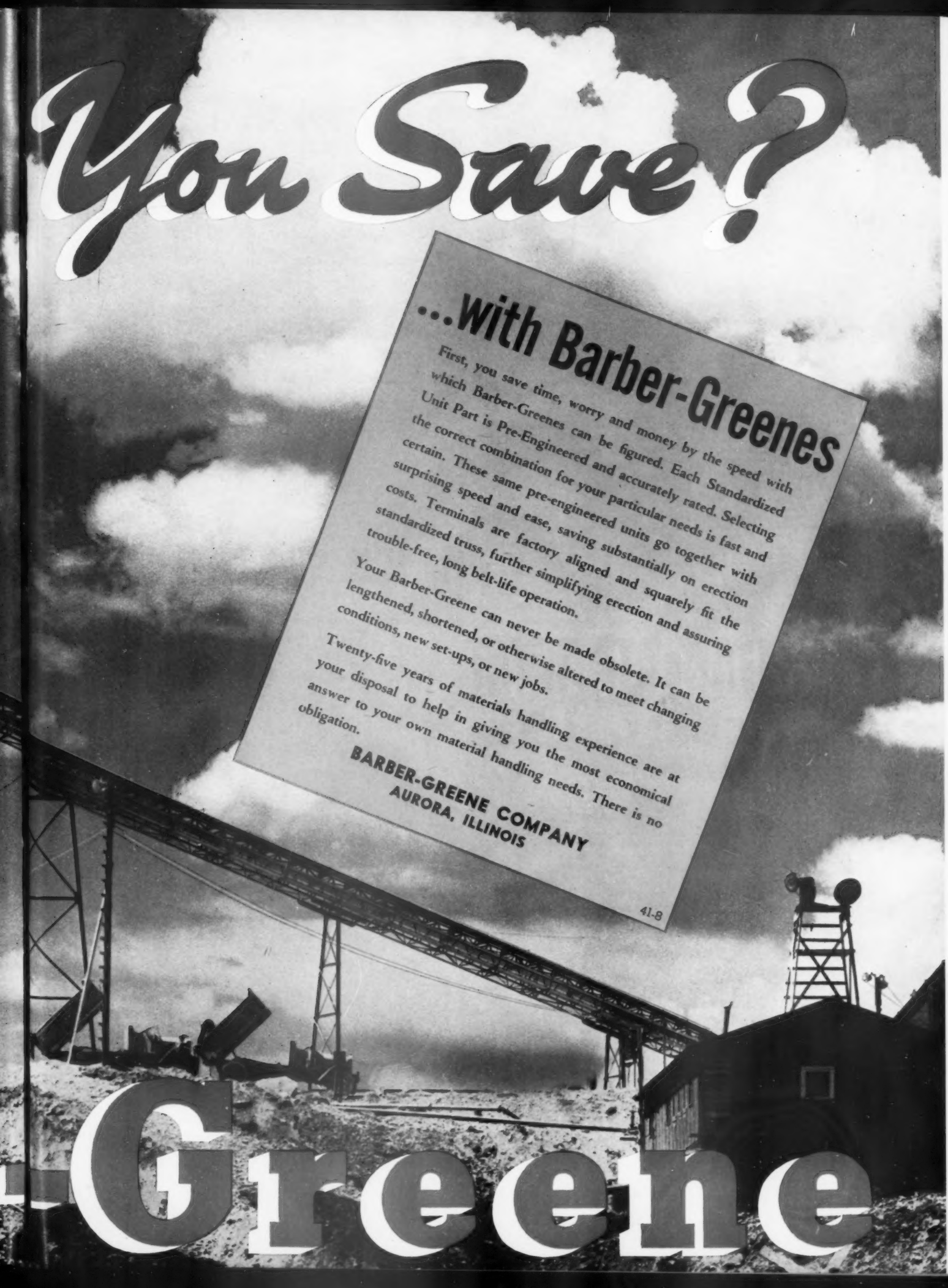
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Your Barber-Greene can never be made obsolete. It can be lengthened, shortened, or otherwise altered to meet changing conditions, new set-ups, or new jobs.
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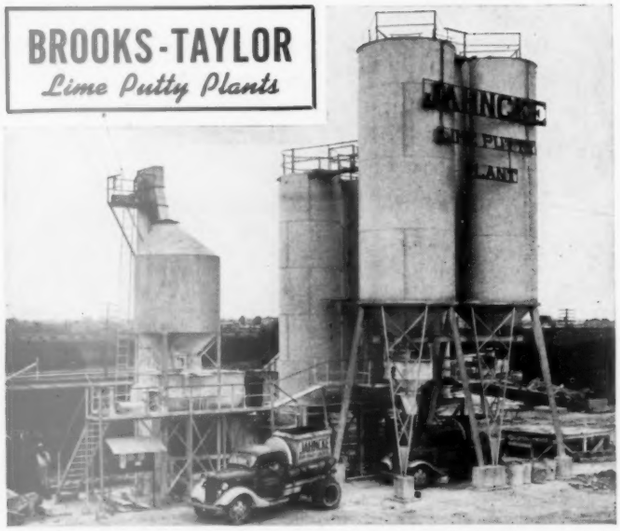
BROOKS-TAYLOR
Lime Putty Plants



Building material firms with Brooks-Taylor Lime Putty Plants, like the one shown above at the Jahncke Service plant in New Orleans, supply ready-mixed aged lime putty sanded brick mortar to their customers. Their bricklayers cut in portland cement and go to work. Write for information on a standard plant to produce and handle aged lime putty by means of the Brooks process.

CHICAGO BRIDGE & IRON COMPANY

Chicago.....2451 McCormick Bldg.
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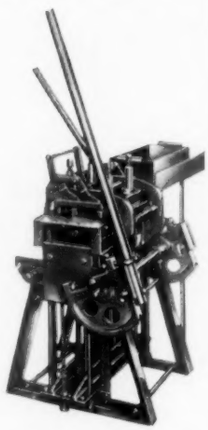
Fully-Pressed Units at Rock-Bottom Cost

This Double Press Block Machine produces the highest types of concrete block or brick, is low in first cost, simple to operate and maintain. Hand operated—no power cost. Long levers exert powerful pressure on both top and bottom of mold. Capacity up to 4 blocks per minute. Get the facts about this money maker today!



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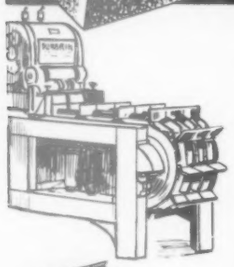

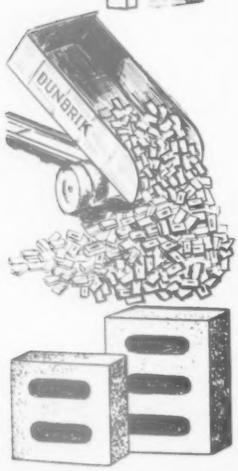

Better, improved building products at lower cost is today's greatest need.

This need is being supplied by local DUNBRIK-DUNSTONE Manufacturers in some localities. Their daily production of over a million units demonstrates the quick acceptance of the products and the rapid growth and expansion of this DUNBRIK industry. Follow their examples. Make these better, lower cost products and enjoy a profitable business of your own by becoming an exclusive manufacturer in your territory.

We supply you with exclusive line production machinery and processes that utilize low-cost raw materials and common labor. Investment much lower and daily production per man much larger than previous methods. Versatile line production equipment enables you to make standard size brick and multiple sizes that short-cut construction costs to the level of frame. And you can make all products in wide range of colors, shades and textures.

Franchise protection—trade-marked products—engineering and advertising service are a few of the advantages that will help your business prosper in this growing industry. Write today for free book "4 Keys to Success." It tells the complete story.

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STORAGE BINS

- Super strength, diagonal locking stave construction.
- Immediate erection.
- Wide range of sizes.
- Easy dismantlement.
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It is better to own a Sherman machine than to compete with one.

SHERMAN'S

Ball Bearing Concrete Pipe Machine, showing the sectional core which is the most economical core. By replacing only one section at a time which is a savings of 75% to the user.

Write for Prices and Information

SHERMAN CONCRETE PIPE CO.
KNOXVILLE, TENN.

The Big Step to Modernization in Concrete Plants

BUTLER BINS . . . .

The Roquemore Sand & Gravel Co. plant at Montgomery, Ala. Butler equipment includes steel storage bin, cement-weighing and aggregate-weighing batchers, and water tank. Estimated plant capacity, 1000 cu. yds. per day.

The Roquemore Gravel and Slag Company, of Montgomery, Ala., has recently completed a central-mixing concrete plant which makes this one of the outstanding material yards in the South.

The cement is fed automatically into a Butler weighing-batcher, and it is mixed with water which has been weighed in a Butler tank.

The aggregates are subsequently weighed in a 3-ton capacity Butler aggregate-weighing batcher, after which the material is discharged into the plant mixer or truck mixers.

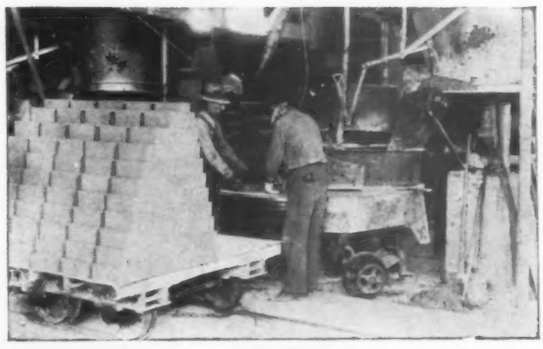
You can duplicate this efficient method of handling cement by equipping your plant with Butler Bins and Batchers.

Write for Full Details

BUTLER BIN CO., Waukesha, Wis.

MARCH ON to the Big Profits in Concrete Brick

. . . made on a "J&C" Machine



Piling bricks from press to car. Rate 24,000 per 8-hour day.

YOU'RE IN STEP with the leader in modern methods of concrete brick production when you "sign up" with JACKSON & CHURCH.

"J&C" Presses mould perfect brick at 150 tons pressure, insuring maximum strength and density per mix of aggregate. Units are uniformly textured and finished throughout, light-colored and stable. NO PALLETS are used, as bricks are stacked direct from the machine.

Our steam curing process permits speedy delivery of brick from the kiln. NO MORE YARD STOCKING OR AGING, with tied-up investments and yarding costs.

"J&C" Presses are available in two sizes. JOIN THE ARMY of satisfied users who are marching to new profit records with JACKSON & CHURCH machines!

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JACKSON & CHURCH CO.

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The CONCRETE MANUFACTURER

70% of All Ready-Mixed Plants

that own and operate Smith-Mobile Truck Mixers, have already come back for additional Smith-Mobiles — as many as 5, 10, 15 or even 25 units. And you can bet that the others will order more Smith-Mobiles as soon as they require additional machines. Surely, this fact is significant. Owners have learned from experience that it pays to replace the slow, old-style hatch-loading machines with faster, more efficient, more economical Smith-Mobiles. Why gamble with new, untried machines? Avoid imitations! Get the modern, time-tested Smith-Mobiles. Ask for Catalog No. 198-A.

THE T. L. SMITH COMPANY • 2887 N. 32nd St • Milwaukee, Wis.

SMITH-MOBILE *The Original High-Discharge* **TRUCK MIXER & AGITATOR**

A 3411-½H

FLUE BLOCKS

FOR FIRE-PROOF CONSTRUCTION

A big paying market and a low-cost product

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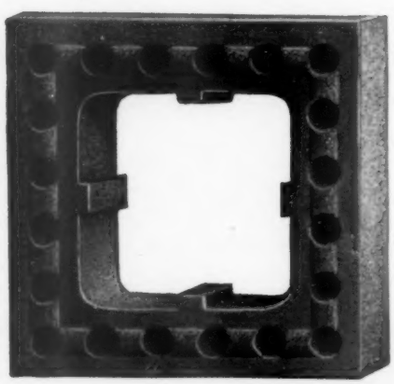
Write for our Catalog No. 41 for full details about the MULTIPLEX Line.



The housing boom and industrial expansion mean *new opportunities* and *extra profits* for concrete products manufacturers. Builders and contractors are demanding "Made-by-Multiplex" flue blocks to insure economically produced units that meet every strength and safety specification in chimney construction.

MULTIPLEX concrete blocks are available in the following types: Standard Ventilated Type; Solid Type for Flue Liners; Light Weight Type for Flue Liners; the new 16" x 16" Ventilated Type for round Flue Liners.

All MULTIPLEX flue block machines now operating can be re-fitted to make the new type units.

Better Chimneys and Better Profits are BUILT WITH MULTIPLEX!

The *Multiplex* CONCRETE MACHINERY CO. Elmore, Ohio

Ransome Truck Mixers

deliver a higher quality concrete

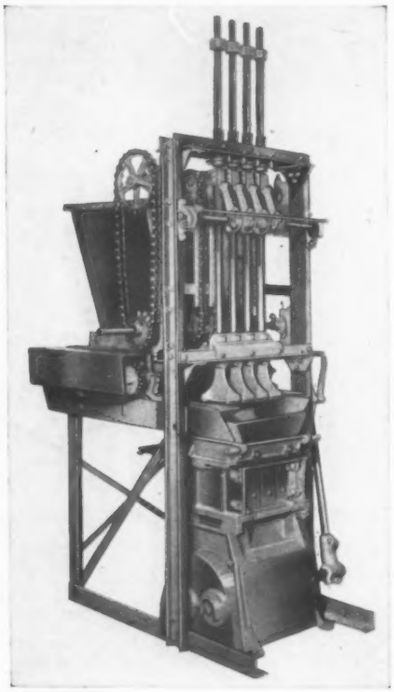
Ransome Truck Mixers and Agitators will help you keep customers satisfied by delivering a higher quality concrete. Let us tell you about Ransome's reasons for superior performance.

RANSOME CONCRETE MACHINERY COMPANY
DUNELLEN NEW JERSEY

Miles CONCRETE EQUIPMENT

SIMPLE AS A-B-C

Miles Equipment does not require the services of an expert mechanic. Anyone without previous mechanical experience can keep a Miles machine in perfect operating condition.



Write for Catalog

The Miles Manufacturing Company
Dept. 2, Jackson, Michigan

QUINN PIPE FORMS

HEAVY DUTY PIPE FORMS

Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new wedge-type lock.

HAND or WET PROCESS

Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service — sizes for any diameter pipe from 12 to 84 inches — tongue and groove or bell end pipe — any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

MEDIUM DUTY PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. For making pipe 12 to 60 inches in diameter —any length.

WRITE TODAY

Get complete information on prices and Special Construction Features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of Quinn Concrete Pipe Machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12th ST. BOONE, IA.

The CONCRETE MANUFACTURER

"Our Joltcretes handle all types of aggregates—turn out good, true blocks and lots of 'em."
H. J. Schmitz
Cement Products Co.
STEARNS
JOLTCRETE

One Joltcrete soon created a market requiring a second Joltcrete in the Cement Products Company's plant at Mansfield, Ohio

That's all there is to it!

Limited Amplitude Vibration—Vibration Under Pressure **is legally available *only* in Stearns Joltcrete Machines. They produce high quality masonry units, of any kind of aggregate, at great speed. That's a combination that will make *any* block plant prosper!**

Write for illustrated folder describing the design, construction and operation of Stearns Joltcrete Machines

Makers and users of infringing machines will be prosecuted

STEARNS MANUFACTURING CO. • ADRIAN, MICH.

When you buy a block machine, Buy a Machine of Proven Worth!

TRAYLOR TY REDUCTION CRUSHER

INVESTIGATE OUR TYPE H BLAKE CRUSHER (BULLETIN 1105), AND OUR MULTI-STAGE FINE REDUCTION CRUSHER—(BULLETIN 113).

The crusher that has made good in a big way in just a few years, in the far places of the earth as well as at home in the U. S. A.,—in mining camps; cement and lime plants; gravel and crushed stone plants; chemical and several other industries,—everywhere, in fact, where a reduction machine was required that could be safely relied upon to operate continuously at high efficiency and low cost.

However, this result was no more than we expected, because these three characteristics, plus simplicity of construction and convenience of operation, were the basic principles of design, in mind from the very beginning. Through wide experience, our engineers knew what was needed, knew also that it was not available elsewhere, and so Traylor proceeded to supply it. Ask any operator of a TY how much truth there is in these words,—we'll supply you with the names of users near you.

There is no room in this space to list the many exclusive features of the Traylor Type TY Reduction Crusher, or to recite the advantages attending its use, but we have just issued a new Bulletin, No. 3112, which "tells all," and more, about the machine. Write for a copy, today!

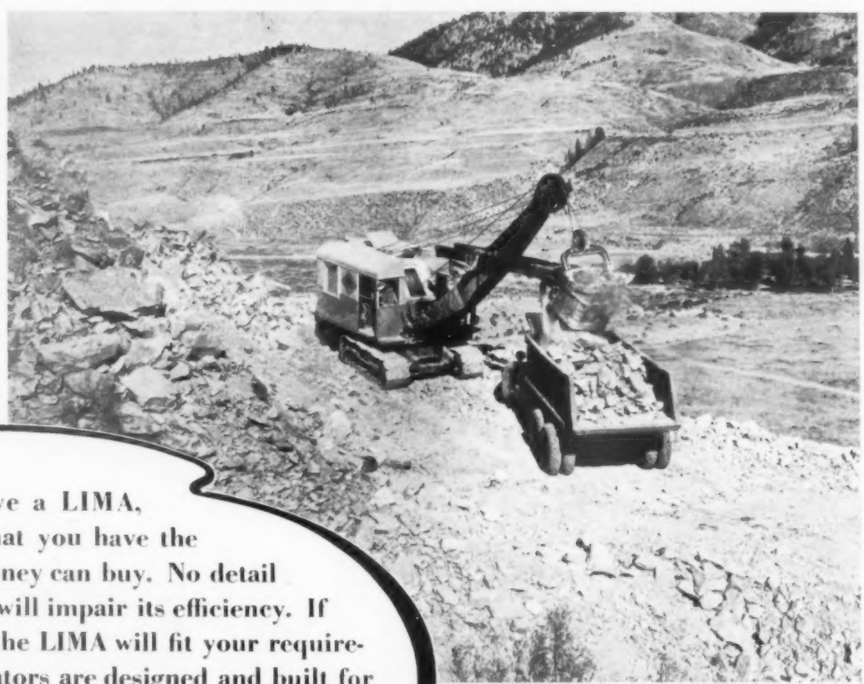
TRAYLOR
ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

NEW YORK CITY, 3916 Empire State Bldg. · CHICAGO, 2051 One La Salle St. Bldg. · SALT LAKE CITY, 101 West Second South St. · LOS ANGELES, 919 Chester Williams Bldg. · SEATTLE, 6311-22d. Ave. N. E.

B. C. EQUIPMENT CO., LTD., 551 Howe St., Vancouver, B. C. · MANILA MACH. & SUPPLY CO., INC., Manila and Baguio, P. I. · MAQUINARIA INTERNACIONAL, S. R. L., Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Oruro, San Juan, P. R.

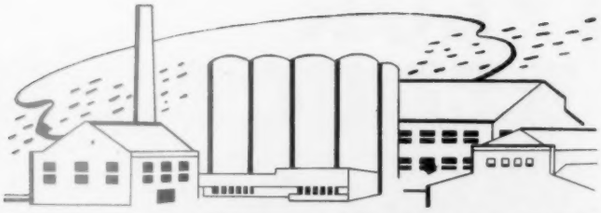
LIMAS
CAN BE DEPENDED UPON TO PRODUCE BIG YARDAGE IN ROCK

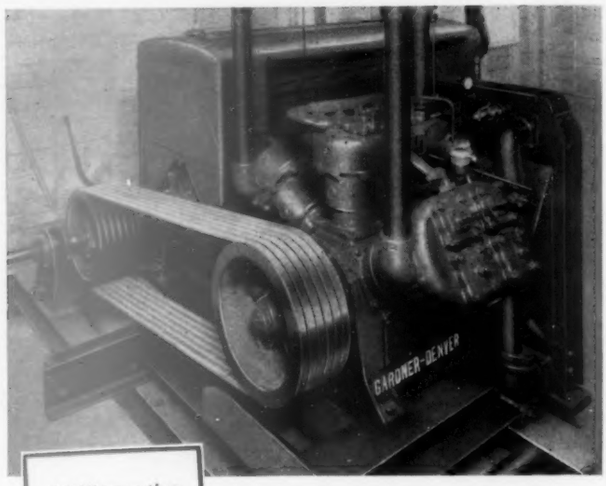


When you have a LIMA, you can be sure that you have the best excavator that money can buy. No detail has been overlooked that will impair its efficiency. If your work is digging rock, the LIMA will fit your requirements exactly. LIMA excavators are designed and built for the job that requires the most in power, strength and durability. Capacities range from ¾ yards to 3½ yards. Write for bulletin covering the size that best fits your requirements.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division LIMA, OHIO, U. S. A.

LIMA





"WB" operating time: 4826 hours . . . Maintenance cost: 25 cents.

"WB" runs 200 hours on each oil change...We never add any oil between changes.

"17,520 cubic feet of air at a fuel cost of 45 cents with our 'WBH' Diesel-powered Compressor."(This figure allows for the unloaded periods.)

EYE-OPENING *Performance* FOR CEMENT MILLS

● These typical user reports show how. In hundreds of plants, Gardner-Denver "WB" Vertical, Two-Stage, Water-Cooled Air Compressors are creating a new conception of low maintenance and dependability.

Here's an ideal compressor for slurry agitation, filtering, and other cement mill service, with these outstanding advantages:

★ **High efficiency, comparable to large, horizontal compressors.**

★ **Low discharge temperature assured by efficient cooling.**

★ **"Air-cushioned" Duo-Plate Valves.**

★ **Force feed pressure lubrication.**

★ **Unusual compactness—requires little floor space.**

★ **Capacities from 142 to 445 cu. ft. displacement per minute.**

For full information on Gardner-Denver "WB" Air Compressors, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

Since 1859

Teeth Tapping

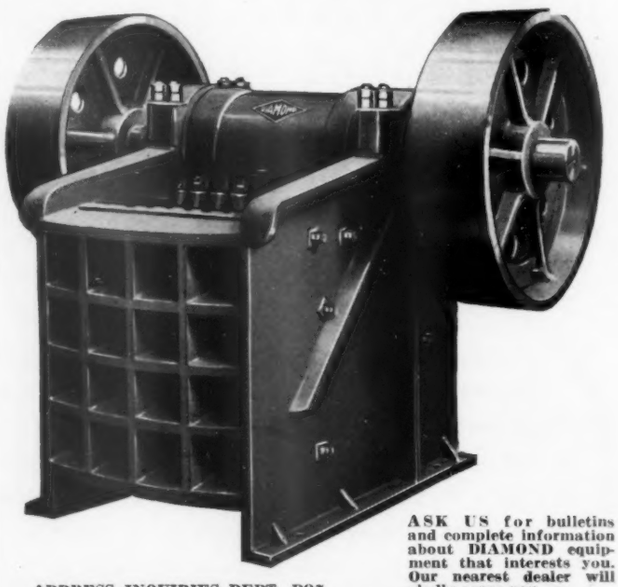
"The origin of Teeth-Tapping, which is the general term applied to sitting with one or both elbows on a desk and trap-drumming rhythmically on the front teeth with a pencil, is a little uncertain. Much of it was done during the late depression. Today, much of it is being done by construction men who are at their wits end to avoid delays, up production and save on costs."

Fast, Uninterrupted Production is Characteristic of DIAMOND Crushing, Screening Equipment

Time and costs are the all-important elements on every job! Time lost in moving equipment to the job; time lost in handling materials on the job, result in *cost losses.* Quick, accurate crushing, screening, washing and conveying of materials without costly, aggravating "shut downs" protect your contract profits, and often *add* to those profits. DIAMOND equipment is *known* for its up-to-date construction and simplified engineering, and is used by contractors the world over.

Portable and Stationary
Crushing and Screening Plants
Jaw Crushers
Roll Crushers
Conveyors
Screens
Feeders
Bins
Grizzlies

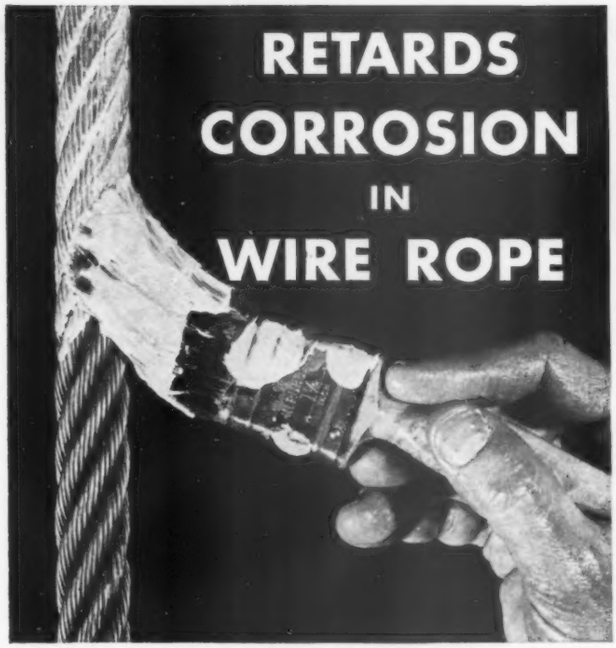
Let DIAMOND Engineers consult with you on the type and size of DIAMOND equipment to suit your requirements. No obligation. Thousands of stubborn problems have been solved quickly, efficiently and at lowest installation costs.



ASK US for bulletins and complete information about DIAMOND equipment that interests you. Our nearest dealer will gladly serve you.

ADDRESS INQUIRIES DEPT. PQ7

DIAMOND IRON WORKS, INC.
ESTABLISHED 1881
AND THE MARR MANUFACTURING CO. DIVISION
MINNEAPOLIS, MINNESOTA, U. S. A.



One of the larger wire rope manufacturers has recently proven conclusively that LUBRIPLATE 130-AA Lubricant retards corrosion and materially lengthens wire rope life. Having an amazingly high film strength, LUBRIPLATE maintains a working film under the tremendous compressions of wire rope service, thus minimizes internal wear of wire against wire and strand against strand.

LUBRIPLATE 130-AA is extremely adhesive and water resisting. It effectively seals in the original oil of the fibre core of the rope. It protects the wires from rust and corrosion. LUBRIPLATE 130-AA will not wash off, so is an equally effective lubricant for exposed gears and bearings that must operate under heavy loads in the presence of moisture and water.

The slightly higher cost of "LUBRIPLATING" a rope is well worth while in view of the definitely longer life it imparts to a rope. Write today for facts and figures.

7 FACTS ABOUT LUBRIPLATE

1. *LUBRIPLATE produces an ultra-smooth, wear-resisting bearing surface.* 2. *LUBRIPLATE reduces friction, thus lowering maintenance and power costs.* 3. *LUBRIPLATE resists rust, corrosion and pitting.* 4. *Most LUBRIPLATE products are white. LUBRIPLATE assures clean lubrication.* 5. *LUBRIPLATE outlasts ordinary lubricants many times.* 6. *LUBRIPLATE is economical—a little goes a long way.* 7. *LUBRIPLATE is available in fluid and grease types for every need.*

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING CO.
NEWARK, N. J. TOLEDO, OHIO
DEALERS FROM COAST TO COAST

LUBRIPLATE
THE MODERN LUBRICANT
THAT ARRESTS PROGRESSIVE WEAR

PAGE BUCKETS BITE RIGHT IN, TOO!

There's no waiting around . . . no jockeying or recasting with a Page AUTOMATIC Dragline Bucket! It's ready to dig the instant it lands in the pit.

Why? Because the Page Bucket is designed to strike first on its forward arch . . . and then rotate back onto its teeth, using ALL its weight to DIG RIGHT IN. The first pull of the load line sets the teeth—and man, what a bite it takes!

No wonder operators by the score report that their PAGE buckets *outdig any other bucket of equal size and weight.*

It will be money in YOUR pocket to put a Page Bucket to work on YOUR job. They are available in sizes from ⅜ to 15 cubic yards and come in three weight groups. For full details write for our new descriptive bulletin titled "Your Dragline WILL Move Dirt Faster."

PAGE ENGINEERING CO.
Chicago, Illinois

PAGE *Automatic*
DRAGLINE BUCKETS

Page Buckets are built in sizes from ⅜ to 15 cubic yards capacity, and in three weight groups . . . a bucket for every job.

Address this Coupon to: Dept. A-14, Page Engineering Company, c/o Clearing Post Office, Chicago, Ill.

Without obligating me in any way, mail a copy of your new descriptive bulletin titled "Your Dragline WILL Move Dirt Faster."

*Name*_____ *City*_____

*Street*_____ *State*_____

MANGANESE STEEL • RENEWABLE

SPROCKET RIMS

The modern practical way... when only the teeth and rim of a worn tractor drive sprocket need replacing... is to rebuild by welding on a renewable manganese steel rim. Naturally, this costs far less than a complete new sprocket. Furthermore, these renewable rims actually outwear and outlast, being made of high grade, wear-resistant manganese steel, proven in practice. Carried in stock. Printed welding directions accompany each rim.

For Caterpillar Tractors

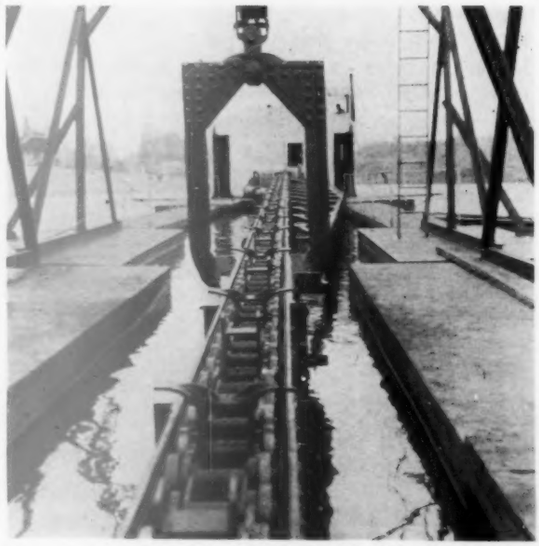
ALLOY STEEL & METALS CO.

1862 E. 55TH ST., LOS ANGELES, CALIF.

Manufacturers of PACIFIC CRUSHING & SCREENING UNITS • PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • Alloy-Manganese CRUSHER JAWS & MILL LINERS • PACIFIC ROCK BIT GRINDERS • HAND WINCHES • CRAWLER SHOES and Other Machinery Wearing Parts

EAGLE installs the L-O-N-G-E-S-T

"Swintek" Screen Nozzle Ladder ever built



Looking down the 80-foot "Swintek"

The Charles England Gravel Company has been dredging sand and gravel near Plainville, Indiana, for the past several years.

The deposit is of glacial origin, and it furnishes a high quality material. However, the finest deposits are below the 35-foot level of the pond.

To reach it effectively and economically, the company recently installed an 80-foot EAGLE "Swintek" Screen Nozzle Ladder. The normal working depth is about 65 feet, but the "Swintek" can work to the limit of the deposit when needed.

Write for our new Bulletin with full details

EAGLE Double Roll Crusher
EAGLE Shale Planer
EAGLE Grinder
Olson Self-Dumping Cages
EAGLE Dry and Wet Pans
Specialized Mining Equipment

EAGLE IRON WORKS
DES MOINES - IOWA

WHY

you should specify

SIMPLICITY SCREENS

Years of operating experience in many hundreds of plants and in many industries have been utilized to produce a screen which contains all these important features: Large Capacity, Positive Action, Durable Construction, Perfect Balance, Freedom from Blinding and Rubber Cushioned Power.

Users everywhere acclaim SIMPLICITY as the truly superior screen.

Our engineers will gladly study your particular screening problem and make a definite recommendation for its most practical solution.

Write for new bulletin No. 41

Simplicity Engineering Co.
DURAND . . . . . MICHIGAN

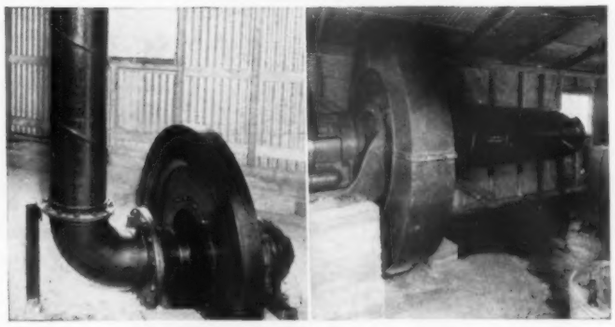
AMERICAN *for* HIGH OUTPUT

High output is one of the paramount advantages of AMERICAN Hammermills and Ringmills. Weight for weight, they will out-range any crusher on the market. Delivering top tonnages *continuously* . . . 10 to 100 tons per hour depending upon the product . . . they provide the maximum value for the investment. Solve your crushing and grinding problems as hundreds of other experienced operators have done—the AMERICAN Way. Get the facts quickly!

AMERICAN PULVERIZER CO.
1059 Macklind Ave. St. Louis, Mo.

YOU GET ALL-OUT PERFORMANCE FROM NAYLOR LIGHT-WEIGHT PIPE

Greater Strength for High or Low Pressure Lines



Exclusive Safety Features

Economies in Transportation, Handling and Maintenance

No other light-weight pipe can give you the ALL-OUT performance provided by Naylor's exclusive Lockseam Spiralweld structure. It is ideal for high or low pressure air and water lines. Its extra strength and safety enable you to use Naylor on applications usually requiring heavier-wall pipe. Sizes: 4″ to 30″ in diameter. Complete fittings and fabrication service.

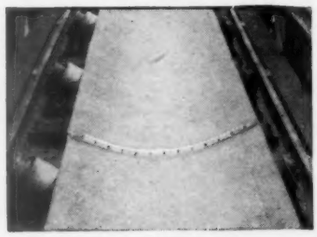
WRITE FOR NAYLOR CATALOG
OR SEND SPECIFICATIONS FOR QUOTATION.

NAYLOR PIPE COMPANY
1257 EAST NINETY-SECOND STREET
CHICAGO, ILLINOIS

NAYLOR LOCKSEAM SPIRALWELD **PIPE**

Talcott Belt Fasteners

FOR CONVEYOR ELEVATOR AND TRANSMISSION BELTING



BELT MAN LUKE *Says:*

for SAFETY STRENGTH and ECONOMY Insist on TALCOTT the EASY FASTENER TO APPLY

Send for Samples

W. O. & M. W. TALCOTT, Inc.
92 SABIN ST., PROVIDENCE, R. I.

A LOT OF SATISFACTION

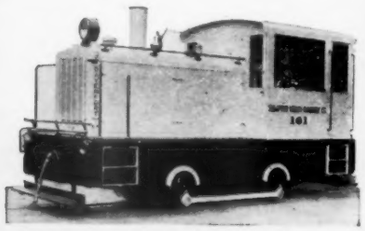
to know that your Davenport Locomotive meets every demand under your maximum production needs—and does it at a low cost that spells P.R.O.F.I.T.S. Davenports give you everything you want in Dependability and Economy—your BEST BUY—backed by more than forty years of proven merit.

Our engineers will gladly submit recommendations and prices.

Export Office
BROWN & SITES
50 Church St., New York
Cable Address "BROSITES"

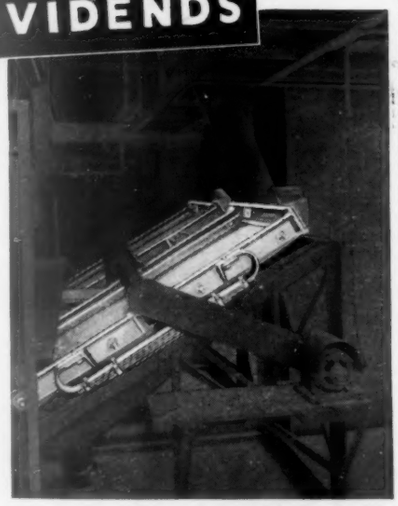
Complete information is yours for the asking.

STEAM • GASOLINE • DIESEL
LOCOMOTIVES
MECHANICAL or ELECTRIC DRIVE



DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

EFFICIENT *Screening* PAYS DIVIDENDS



● Link-Belt Vibrating Screens assure exact and careful screening, in greater volume at lower cost. The vibration is uniformly distributed and maintained, mechanically. The screen cloth surface is entirely unobstructed—no "dead" areas. Low in first cost—low in maintenance — an economical screen to operate. It is a triumph of mechanical vibration. Send for Book No. 1762.

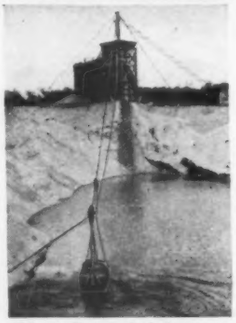
Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, Dallas, San Francisco, Toronto, or any of our offices, located in principal cities.

7671

LINK-BELT *Vibrating* SCREENS

SAUERMAN *Long Range* MACHINES

DIG, HAUL and DUMP *in One Operation*



(Above) Two typical Sauerman installations—a Scraper at work in a dry pit and a Cableway in a wet pit.

During more than 30 years of service all over the world, Sauerman Scrapers and Cableways have proved to thousands of users that they are the most economical machines for long range material-handling in general, and especially for pit and bank excavation, river dredging, moving over-burden and stockpiling.

These machines will dig any material that a plough can penetrate. One man controls the entire operation. Power cost and maintenance are exceedingly low per cubic yard of material handled.

A Sauerman machine digs with equal facility under water, on mushy ground, on a hillside or in a rough pit. Operation is continuous-digging, hauling and dumping. Capacities run from 10 to 600 cu. yd. per hour, varying in accordance with size of bucket and length of haul.

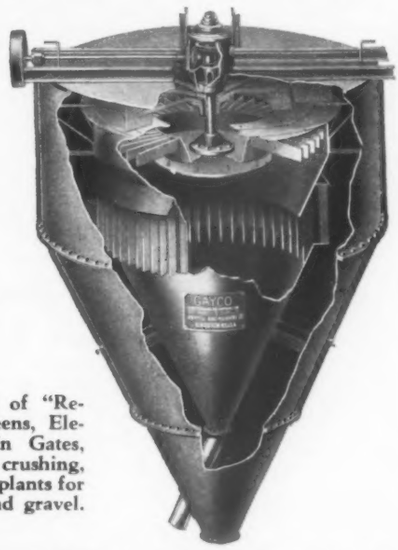
Write for Catalog

SAUERMAN BROS., INC.
434 S. Clinton St., Chicago

Uniform Separation

The new model GAYCO Centrifugal air separator makes possible the uniform and increased recovery of cement and other extremely fine materials within a range of 60 to 400 mesh.

- Greater Capacity
- Cleaner Tailings
- 99% Through 325 Mesh
- 25% to 30% greater recovery of fines.
- Not affected by variation in speed or rate of feed.



Manufacturers also of "Reliance" Crushers, Screens, Elevators, Conveyors, Bin Gates, Grizzlies. Complete crushing, screening and washing plants for crushed stone, sand and gravel.

UNIVERSAL ROAD MACH'Y CO.

Rubert M. Gay Division 117 Liberty St. New York, N. Y.
Canadian Representative: F. H. Hopkins & Co., Ltd., Montreal

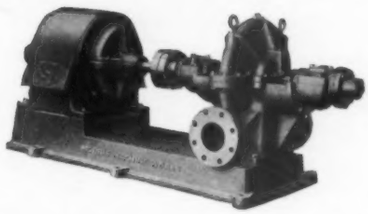
LOOKING FOR USED EQUIPMENT?

Refer to the listings in the Broadcast Section in this issue for a wide variety of used and surplus machinery and supplies.

The MORRIS HYDRAULIC COLUMN

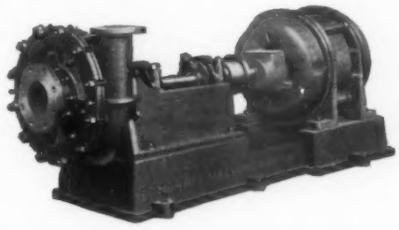
News of interest to Centrifugal Pump Users

PUMPS that quickly repay their cost



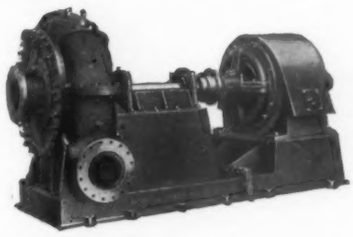
Through higher efficiencies

It isn't so long ago that 75% was considered a high efficiency for a clear water centrifugal pump. However, today, the remarkably high efficiencies of Morris Pumps will save 10% or more of the power required by older pumps. Figure for yourself what this would mean to you—and then investigate Morris Pumps.



Through lower maintenance

When pumps are to handle abrasive materials such as cement, slurry, sand and gravel, simple design, long wearing metals, and provision for economical replacement are essential. Operating records prove that Morris abrasive-handling pumps have these characteristics.



Through greater capacity

For large-capacity dredging or clear water requirements, Morris offers designs that have proven their thorough dependability and troublefree operation that assure low maintenance expense. Built for all capacities and heads.

For authoritative recommendations on any pumping or dredging problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in Principal Cities.

BUCKETS READY FOR IMMEDIATE DELIVERY . . .

Speed up your material handling with a new Industrial Brownhoist clamshell bucket. All standard types ready for immediate shipment (photo shows a small part of our large stock). Quantity production plus our manufacturer-direct-to-you sales policy lowers your bucket investment. Write today.

INDUSTRIAL BROWNHOIST BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

Lime Producers are saying:

Watch Your *Lime Profits GO UP!*

with the
YORK-KUNTZ
CONTINUOUS LIME KILN
HYDRATORS & HYDRATE PLANTS

Production and profits in lime and hydrate plants just naturally zoom to a new "ceiling" when you install the York-Kuntz patented kiln.

Our exclusive "continuous feed-continuous discharge" method assures exact control of all operations and top tonnage figures. Central combustion feature eliminates danger of over-burning and under-burning, and gives a high lime-fuel ratio.

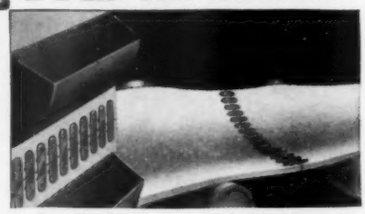
Consult us at once if your plant is running at less than 100% efficiency. We have 40 years' experience in every angle of this business, and are prepared to prove that it always pays to "call an expert."

Write for Information

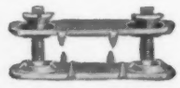
McGANN MANUFACTURING CO., INC.
William J. Kuntz, Pres.
LIME & HYDRATE PLANTS CO.
YORK **PENNSYLVANIA**

Keep your conveyor belts going with FLEXCO HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.



• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.



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Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

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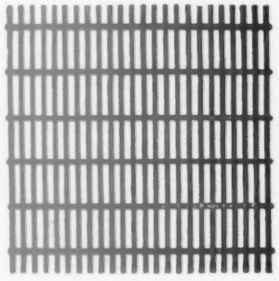
Sold by supply houses everywhere



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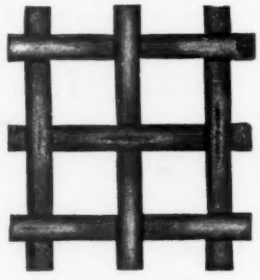

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J-T ELECTRIC VIBRATING SCREEN

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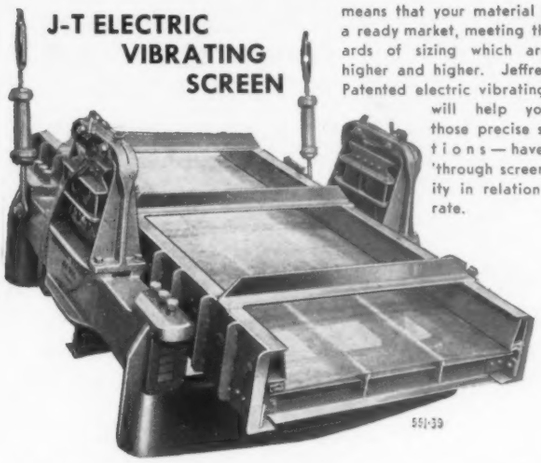

All J-T Screens, single or double deck styles, use electric vibration to control tonnage. For fine sizing—two types conveyanscreen with vibrator mounted above screen sash; for coarser and intermediate sizing—FB gravity type with vibrator or power unit surrounding screen sash. Heller piano wire cloth—meshes ¾" to 150 mesh—available. Send for Catalog No. 650-M.

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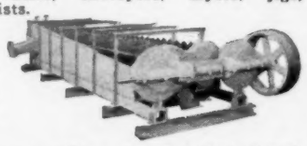

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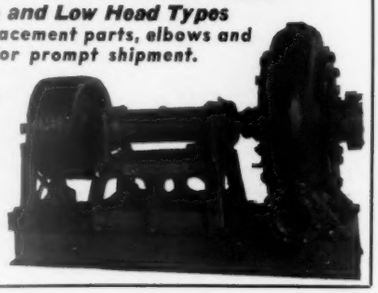

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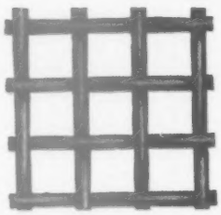

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1—18″x176′ Northern stationary belt conveyor, steel frame, motors, belt and catwalk.

10—Portable belt conveyors, gas or electric from 18″x28′ to 24″x53′ Barber-Greene, Buren, Northern, Stephens-Adamson and National.

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1—Link-Belt K-48, Serial No. 1728 with 60′ boom 2 yd.

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2—Northwest Model 4, Serial Nos. 3441, 3445 with 40′ boom 1 yd.; also 1-yd. pull shovel.

1—Northwest Model 104, Serial No. 2079, 45′ boom, 1¼ yd. bucket; with 1 yd. shovel attachment.

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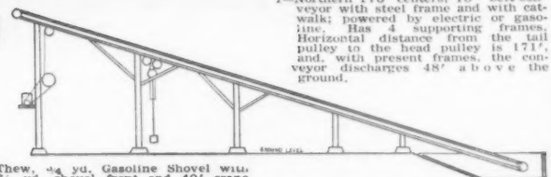

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10—Jaw Crushers: 3—15x36″ Universal; 1—15x36″ Cedar Rapids; 1—15x26″ Champion; 1—12x20″ Acme; 2—10x20″ Climax No. 21½; 1—9x16″ Telsmith No. 9A; 1—9x15″ Champion.

1—Set of Allis-Chalmers, smooth type crushing rolls, 42x16″.

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*3—10x36 pitman assemblies for 10 x 36 Jaw Crusher	Rebuilt
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Jaw Crushers—4″x8″ up to 66″x84″.
Crushing Rolls—16″x10″ up to 54″x24″
Gyratory Crushers—No. 3 up to Mammoth
Ring Roll Mills—No. 0, No. 1, No. 1½ and No. 2.
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Direct Heat Rotary Dryers—3½′x25′, 4′x30′, 5′x30′, 5½′x40′, 6′x50′, 7′x50′ and 8′x50′.
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New Dryers built for all purposes.

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800 Cast Iron 45 Per Cent Pallets for Miles Stripper Machine.

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Barber-Greene Loaders, 24, 25, 42 & 82, Rains 75.
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Two ¾-yd. Erie type B Steam Shovel and Crane.
120 HP Automatic Machine Co. Gasoline Engine.

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DEPENDABLE USED MACHINES

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½ yd. dragline with bucket; good cond.
Rebuilt Sullivan 110 ft. compressor.
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36" Allis-Chalmers Style "N," short shaft; 42" Gates; 20" Kennedy Gearless; 20" Traylor; 20" Allis-Chalmers Superior McCully; 15" Telsmith; 13" Superior McCully and smaller sizes.

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30x42" Buchanan Type "C"; 48x42 Traylor Bull-dog; 66x86 Traylor; 48x60 Traylor; 36x24 Farrel; 18x36 Farrel; 24x36 Allis-Chalmers; 8x36 Universal Roll Jaw; 18x30 Allis-Chalmers and smaller sizes.

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8'x125', 8'x110', 6'x120', 6'x60'.

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Ruggles-Coles, double shell: 5'x26', 5'x30', 5'6"x60', 80"x45', 104"x60', 104"x85'. Single shell: 4'x30', 5'x30', 6'x40', 6'x50', 6'x60', 8'x60', 8'8"x85'.

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Hardinge straight side Rod Mills, iron lined, herringbone steel gears, enclosed gear drive units, change of rods with each mill. Arranged for peripheral or trunnion discharge. In excellent condition and for immediate shipment.

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2, 3 and 4 roll High Side; Nos. 0000, 00, 1 and 3, Beater type—also Nos. 55, 60, 90 Imp type, also No. 40 Imp with 6' Centrifugal Separator.

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10' Sturtevant; 8', 10', 12' Gayco; 6' Raymond; also 5' dia. Raymond "Whizzer" for attachment to roller mill.

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Weber type, made by Arnold & Wiegel with No. 1 Raymond Bros. Lime Separator; also Kritzer.

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1—32 ton Porter Saddle Tank, rebuilt

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Beaumont 42 yd. two compt. bin.
200 ton rock storage bin, steel, heavy construction.
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Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8S, 8B; Traylor 8", McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x39, 16x32, 36x48, 48x60.
Complete portable rock crushing plant, nearly new, with crusher, elevator, screen, etc.

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SLIP RING MOTORS
75 HP. 1800, 3/60/220, General Electric IM.
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40 KW. 3/60/220, 1200 RPM. Fairbanks-Morse. 4¼x6" six cylinder full diesel complete.

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9x10 Sullivan Class WG3, 172 CFM. 100# pressure.
17&10x14 Ingersoll-Rand 2 stage 677 CFM. 100#

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2—Sets STURTEVANT Balanced crushing rolls 21"x 10½" and 36"x16".
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3x4' 1-deck Leahys 3x6' 2-deck Leahy
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24"-g. Portable Track and Switches, 1500'.
6—24" Atlas End Dump Cars, ½-yard.
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30"-g. Mercury 2-ton Battery Locomotives.
8—36" Koppel V-Dump Cars, 3-yd. and 4-yd.
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Crushers
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Gyratory—8" Traylor, No. 25 and 37 Kennedys.
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5"x32', 7"x32', 8"x32', 10"x35', 12"x35', 14"x32', 14"x50', 16"x60', and 20"x40'. Chain, Buckets, Belt, Casings, Drives.

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18"x44' B-G and 20"x45' Portable Types.
14" to 36" wide Gravity Roller Sections.
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DRYERS: 5'x35', 5'x40', 5½'x32', 6'x40', 6'x60'.
CRUSHING ROLLS: 6"x5", 24"x14", 42"x16".
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HARDINGE MILLS: 4½'x16", 5'x22", 6'x22", 8'x30".
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2—1300 to 1500 Ft. Air Compressors.
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64 pieces — 6 ft.
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8-B Telsmith primary crusher, high speed shafts and roller bearings. Good condition.
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Equipment located in southern Michigan.

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2 Locos, gas S/G 10 ton—1 Clyde Lime hydrater.
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8 cent. pumps, 5 & 2 stage, 500, 600, 1000 with motors.
3 Compressors 600 ft. motor drive, 8 shaker screens.
Crushers 10K, 9K 6K, McC 20", 10", 7", also rolls.
Loco. cranes 2—25-30 ton RR. 20 ton cat all steam.
Mine or quarry hoists, rotary friction slope.
Slackline Streets 2 yd. complete with motor.
Wanted—Danish flint pebbles

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1—27 Cubic Foot Concrete Mixer.
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505 Ft.	36″	6	1/8″	1/16″	Conveyor
856 Ft.	30″	6	1/8″	1/16″	Conveyor
520 Ft.	30″	5	1/8″	1/16″	Conveyor
180 Ft.	24″	6	1/16″	1/16″	Elevator
2305 Ft.	24″	5	1/8″	1/32″	Conveyor
1298 Ft.	24″	4	1/8″	1/32″	Conveyor
250 Ft.	22″	8	1/16″	1/16″	Elevator
1874 Ft.	20″	5	1/8″	1/32″	Conveyor
520 Ft.	20″	4	1/8″	1/32″	Conveyor
506 Ft.	18″	6	1/16″	1/16″	Elevator
1765 Ft.	18″	4	1/8″	1/32″	Conveyor
285 Ft.	16″	6	1/16″	1/16″	Elevator
1450 Ft.	16″	4	1/8″	1/32″	Conveyor
516 Ft.	14″	6	1/16″	1/16″	Elevator
509 Ft.	14″	4	1/16″	1/32″	Conveyor
420 Ft.	12″	6	1/16″	1/16″	Elevator
385 Ft.	12″	4	1/16″	1/32″	Conveyor

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PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 528, 1300 & 2200 Ft.

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50 Skips and Battleship Type, 2 to 6 Yds.
5 Owen & Bucyrus Rock Grabs.
CLAMSHELL: 1/2, 3/4, 1, 1 1/2 & 2 Yds.
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12 Ton NORTHWEST 50 Ft. Boom Gas.
12 Ton KOEHRING 45 Ft. Boom Gas.
16 Ton Speedcrane, Gas, 50 Ft. Boom.
25 Ton BROWNING & 30 Ton AMERICAN Locomotive.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
2 1/2 Yd. Lorain Model 95, Diesel Dragline.

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3/4 Yd. KOEHRING Gasoline.
3/4 Yd., 1 1/4 Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas & 7/8B2 Steamer.
1 1/2 Yd. BUCYRUS 41B Steamer.
1 1/2 Yd. Lima 750 Diesel.
1 1/2 Yd. KOEHRING 601—Gas.

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20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

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6x8 Continuous Pebble Mill.
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6'x22" HARDINGE CONICAL Pebble Mill.
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4x16 Smidth Tube Mill Silex.
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36x60 Fairmont Single Roll.
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10x8, 13x7 1/2, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36.
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18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
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29T ARMSTRONG Well Drill.

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7 Gasoline 15, 40, 60 & 100 H.P.
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Nos. 4, 6 & 8 Williams Jumbo.
No. 36 Am. Ring Roll.
Gruendler No. 6X.

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72 Ton BLAW-KNOX 2 Compt.; also 250 ton.
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400 Bbl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher.

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200 K.W. RIDGWAY 3/60/2200-250-275 v., 900 rpm.

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240 K.W. F.M. 3/60/2300 v.
300 K.W. Worthington 3/60/2400 v.
125 K.W. F.M. 250 v. D.C.

RAYMOND MILL

5 Roll High Side.

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BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS

36' In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7 1/2x100, 8x125 & 10x20 Kilns.

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GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

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DIESEL: 7—4 1/2, 8 and 15 Ton 36 & 42 In. Ga.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton.

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VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72. HUMMER, ROTEX, NIAGARA & ROBINS. LINK BELT & HURON.
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30" Reciprocating Plate Feeder.

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1—3/4 yd. Gas 1—1 1/2 yd. Electric
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42 IN. BELT CONVEYOR

350 Ft. Barber-Greene Sectional Steel Frame Roller Bearing Belt Conveyor. New 1939.

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21 Worthington 169 Drifters.
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6 Gardner-Denver 15 Jackhammers.
45 Ingersoll-Rand Drifters 870, N75, X71, DA35.
11 Ingersoll-Rand Sa49 Jackhammers.

R. R. TRACK SCALE

125 Ton 56' x 10'6" Platform 4 Section.

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5 Clyde 75 to 100 ft. Boom.

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96 H.P. Waukesha Hesselman.
2—370 H.P. Chgo. Pneu. RHA45S, 360 rpm.
420 H.P. Sulzer, 1000 rpm.
600 H.P. B. & W. 550 rpm.

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Symons No. 5 1/4 and 7 Ft.

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Lincoln Bldg., 60 E. 42nd St., New York, N. Y.
Murray Hill 2-3075 or 2-3076

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1—McMiller 2 yard coal Clam Shell Bucket.

1—1/2 yard Owens Clam Shell Bucket.

1—82' Steel Fabricated Mast in three sections.

1—Concrete Tower Boom 52', two section.

1—6" Direct Connected Steam Driven Centrifugal Pump made by Morris Machine Company, Baldwinsville, New York.

1—Steam driven Vulcan Pile Driving Hammer, No. 1274, complete with pair of 30' pine leads.

1—100 h.p. Erie Boiler 66" x 16' Ohio standard 125 lb. pressure, complete with stoker.

THE ISRAEL BROS. CO.

P. O. Box 6, Station A
1939 E. First St. — Dayton, Ohio

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BALDWIN 58 ton 6 wheel switcher, 19x24" cyl. Walscheart valve gear.
DAVENPORT 22 ton 4-wheel Saddle Tank; Cyl. 11x16.
PLYMOUTH 12 Ton 36" Ga. Gasoline Locomotive; Hand Brakes.
3 PLYMOUTH Model FL, 24" Ga. Gasoline Locomotive.
1 WHITCOMB Model CS-4, 4 1/2 Ton, 24" Gauge Gasoline Locomotive.
P&H Model 206, 3/4 Yd. Comb. Crane & Dragline; 38' Boom.
KOEHRING Model No. 1, 3/4 Yard Comb. Shovel, Crane and Dragline.
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1 1/2 Yard HAYWARD clam shell bucket.
1 1/4 Yard BUCYRUS-ERIE dragline bucket.
10—BUDA Model 119 and Model 19-L motor section cars for standard gauge track, Buda air cooled gasoline motor.

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1—13x36 Roller Bearing crusher.

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CLYDE 10-ton steel guy DERRICK, 70' boom, 85' mast, bullwheel, cables. Like new.

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AMERICAN 2-drum electric HOIST, with swinger, 40 hp, 3 phase 60 cycle motor.
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NORTHWEST Model 2 shovel, overhauled.
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SAND and GRAVEL PROCESSING SERVICES
available on tonnage basis

We will install NEW, MODERN portable or semi-portable plant in any practical location. Capacities 100 to 150 tons of stone per hour or 150 to 200 tons of sand and gravel per hour.
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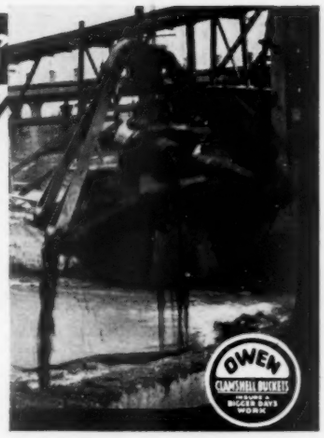
OWEN-EQUIPPED *Mobile units* BOOST GRAVEL PLANT *EFFICIENCY*

WHETHER it's shuttling up the track to the pile for a capacity grab of dry gravel, or just a matter of swinging the boom and dropping that OWEN into the water pit for a mouthful of dripping aggregate,—one thing is certain; for greatest daily output with minimum operating cost "OWENIZED" mobile units are requisite.



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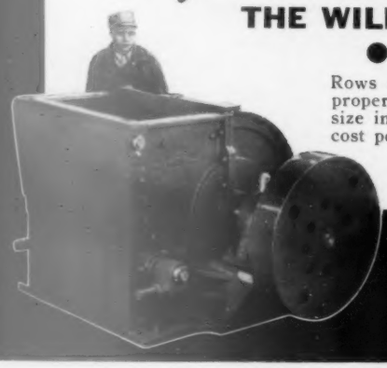
***See also Detail Information in the 1941 Pit and Quarry HANDBOOK**

for Making 1¼", ¾" or Agricultural Limestone...

THE WILLIAMS "SLUGGER" CRUSHER AND PULVERIZER

● Handles Large Stone or Screen Rejects ●



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802 St. Louis Ave. St. Louis, Mo.

Williams

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PATENT CRUSHERS GRINDERS SHREDDERS

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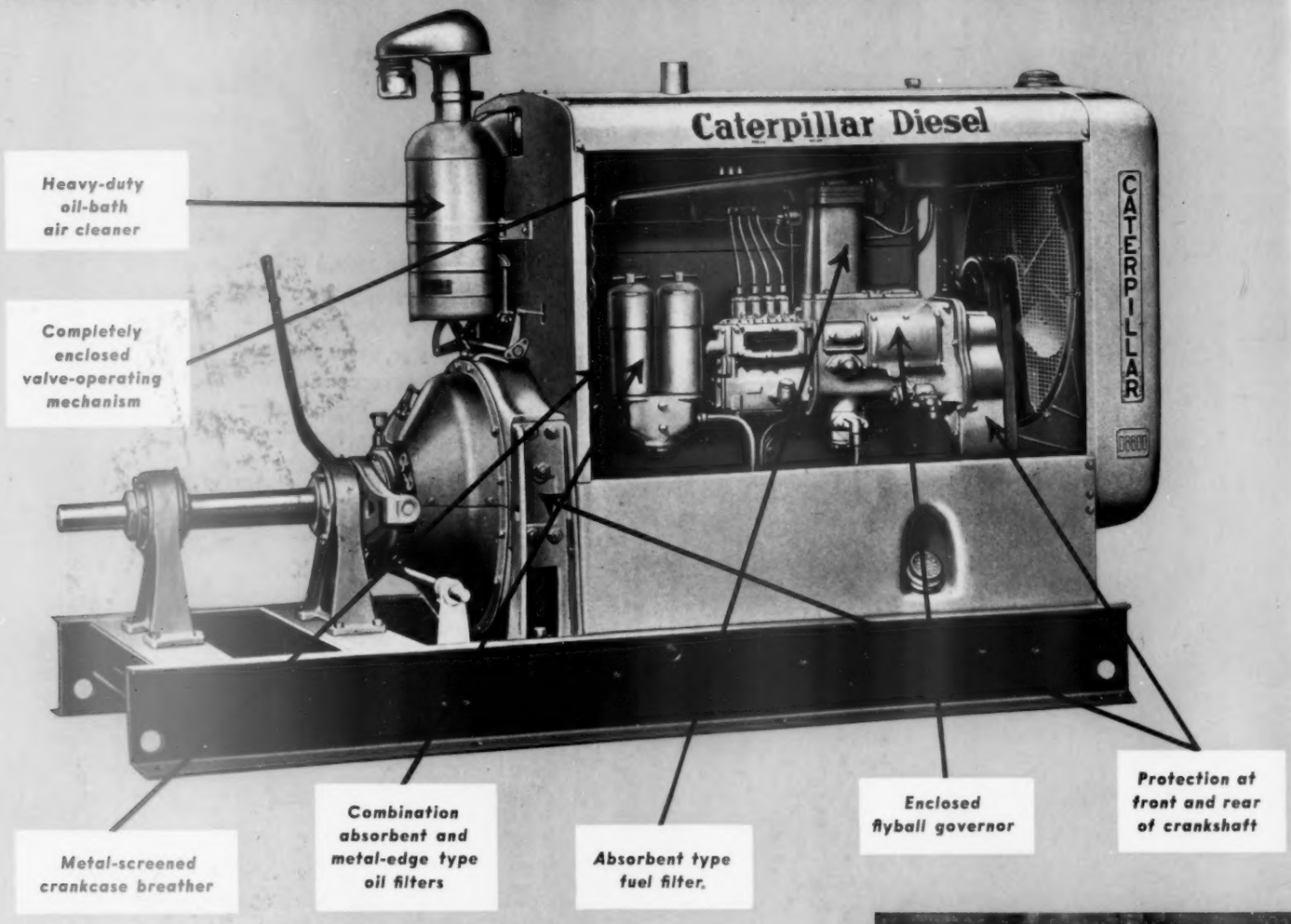
AGAINST THE DUST AND GRIT OF THE GRAVEL PIT



NOTHING in the operation of a crushing plant is such a constant threat against the life and full-powered performance of its engines as dirt, dust and grit. But in "Caterpillar" Diesels you have the most carefully protected wearing surfaces of any Diesel engines in the world. No possible entry for unwelcome foreign substances via air, oil or fuel is left unguarded. No thought or effort is spared toward enabling "Caterpillar" Diesel Engines to withstand the punishment of day-and-night running under torturing loads, weather or other operating conditions.

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"HI-ELECTRO" HARDENED AND SUPERFINISHED CRANKSHAFT. . . meaning greatly lengthened bearing life through harder, smoother wearing surfaces than is possible under any other practical method of heat-treatment and finishing.

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Let your "Caterpillar" dealer give you other dollars-and-cents figures to show you why "Caterpillar" Diesel Power should be operating your pit or quarry equipment.

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The truck-mounted "Caterpillar" Diesel D13000 Engine driving this Diamond Iron Works portable crushing and screening plant operates 10 hours a day on about 3 gallons of fuel per 50-ton hourly output. ("Caterpillar's" exclusive, highly efficient fuel system requires no operating adjustments and burns a wide range of fuels—including even such extra-cheap lower grade as No. 3 domestic burner oil.)

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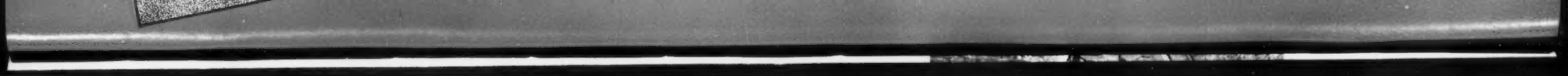
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